# Municipal Journal

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## CONSTRUCTING PASSAIC VALLEY PUMPING STATION

**Plant to Handle Three Hundred Million Gallons Being Built on Ten Feet of Mud Two Feet Above Mean Tide —Building Side Walls in Cofferdams—Building Sewer—Construction Plant.**

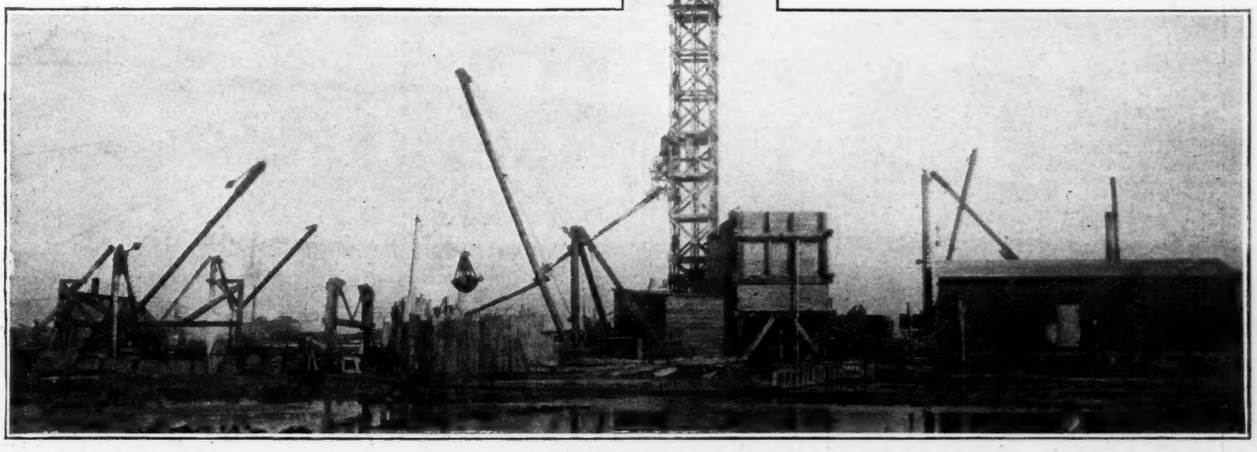
The work on section 5, contract 41, of the Passaic Valley sewer is proceeding rapidly. The contract calls for 1,015 feet of standard 12-foot 6-inch sewer built in open cut and the construction of the pumping house, 400 feet of concrete railway trestle and the foundations for the boiler and coal houses. The machinery, including the pumps, boilers, screens, etc., will be furnished and put in place by the Passaic Valley Sewerage Commissioners. The work included in the contract comprises about 20,000 cubic yards of excavation and 3,000 yards of concreting on the sewer section and about 40,000 yards of excavation and 20,000 yards of concreting on the pumping plant. Practically all the concrete used in the pumping plant will be heavily reinforced.

The sewage, collected along the route of the sewer, which parallels the Passaic river and passes under Newark, enters the pumping plant at a bellmouth, where the standard 12½-foot sewer opens up into three 12-foot conduits. Passing through these, the sewage enters the grit chambers, three in number. These are each 16 feet wide and 35 feet long. From the grit chambers, the sewage passes through three other conduits, similar to those entering the grit chambers, into the screening chambers, likewise three in number, and through them. Leaving them, it turns to the left and enters the suction sewer, from which the sewage flows to the pumps. The suction sewer is 15 feet wide by 18 feet 6 inches high, with vertical sides and an arched roof.

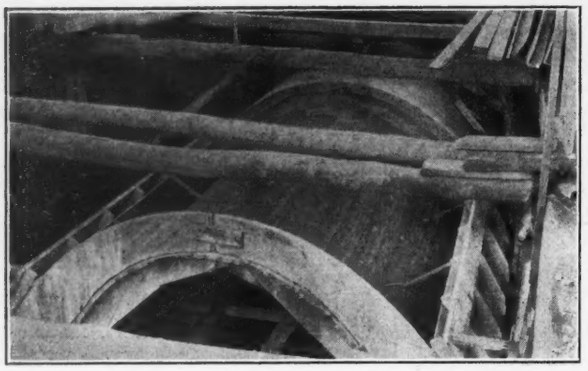
From the suction sewer, the sewage will ordinarily pass to the pumps through openings in the bottom. These openings, which necessitate the use of some very complex forms in construction, are elliptical at the top with axes of 10 feet and 15 feet, but converge at the bottom to connect with curved iron castings, circular in shape and with a diameter of 5 feet. Through these castings the sewage will pass into the pumps. There will be four of these pumps of such capacity that one may be held in reserve for breakdowns or other emergencies.

From each of the pumps, the sewage will be discharged through a 5-foot pipe. These pipes will unite, in pairs, into two 8-foot pipes which will carry the sewage under pressure to the valve chamber, whence it will be sent to the elevated sedimentation tanks and then through the pressure tunnel under Newark and New York bays and Bayonne to the terminal chamber at Robbin's Reef, where it will be discharged into the waters of New York bay, as described in Municipal Journal of February 18. The valve chamber is also connected by means of a bypass with the suction sewer so that, in case of emergency, the sewage may be passed directly into the pressure tunnels under its own head and without going through the pumps.

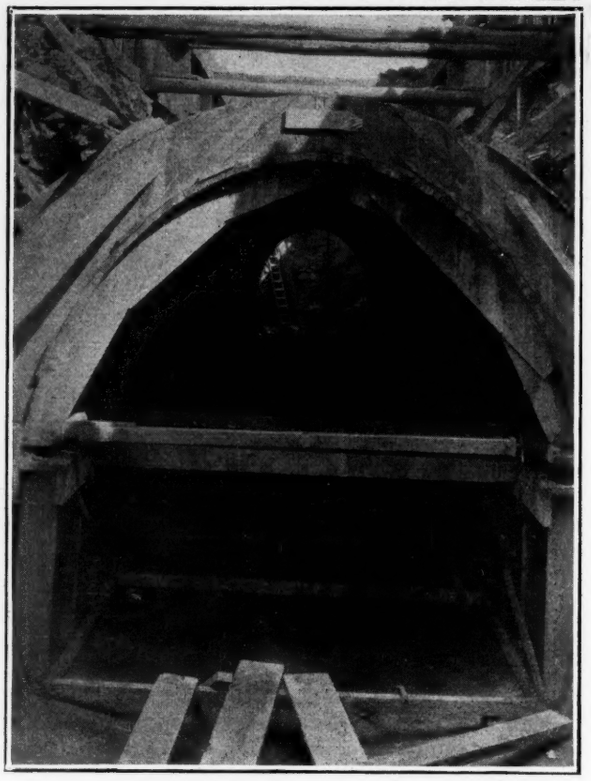
The approach sewer, which is a standard horseshoe section 12 feet 6 inches in both horizontal and vertical diameter, was constructed of concrete having a minimum thickness at the center of the invert of ½ inch and at the top of the arch of 14 inches. The 1,015 feet included two sharp curves, one with a radius of 50 feet, and about 750 feet of straight cut averaging about 30 feet deep, part of



GENERAL VIEW OF CONSTRUCTION WORK ON PUMPING STATION.
Cement House at the Right. Concrete Distributing Tower in Center. Stone and Sand Bins at Foot of Tower.



INNER AND OUTER FORMS FOR SEWER ARCH.



STANDARD 12 FT. 6 IN. SEWER ARCH FORM.

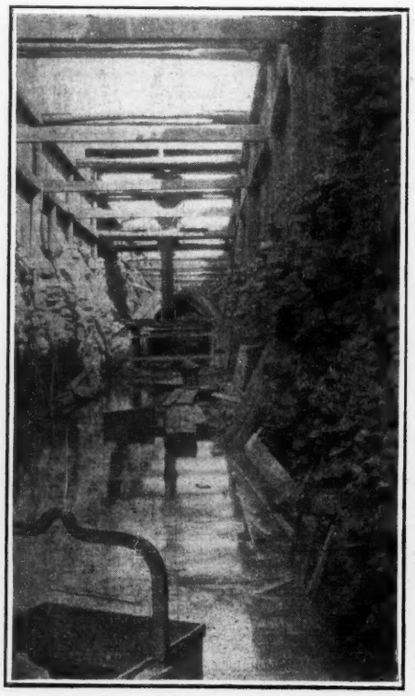
which was in rock. On this straight section, a Lidgerwood cableway was used on excavation. As fast as the trench was completed the forms were set and the concrete put in place. A ½-yard mixer was used in this work. At the present time, work is practically completed on the approach sewer.

The pumping plant is located on the salt meadows near the foot of Doremus avenue, Newark. The character of the soil of which the meadows are composed is such as to make the construction work very difficult, especially so because the meadows here have an elevation of only 102.50 (mean water level 100.00) and are liable to be flooded by high tides. Marsh mud forms the top layer of soil and extends down about 10 or 12 feet. Just under it is a thin layer (this is sometimes missing) of blue clay, then from 10 to 25 feet of stiff red clay, and under this, at an uncertain depth, red shale and rock. The marsh mud is very sticky, fibrous and yielding and is rather hard to handle, though it can be taken out fairly well with an orange peel or clam shell bucket. The red clay is too stiff and hard to handle in this manner and is being taken out almost entirely by hand. The blue clay is not present in large enough quantities to cause any trouble or to necessitate any special provision for handling. Shooting was tried in an effort to loosen the red clay so that it could be taken out by the orange peel buckets, but had to be abandoned on account of the danger in the braced trenches. Men with picks now loosen the clay, which is then shoveled into skips or buckets.

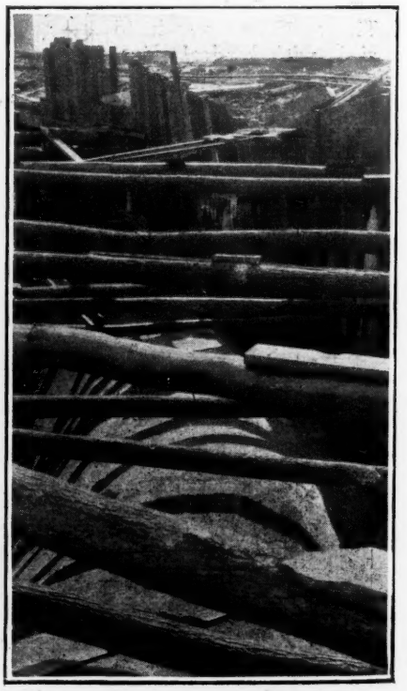
Piles had to be driven before the concrete plant could be built and were even necessary for the foundations of the temporary plant, it being difficult to handle even the light travelers until a foundation had been provided for them.

To construct the pumping plant, an excavation about 100 feet wide, 400 feet long and 40 feet deep had to be made. To make this excavation by the cofferdam method and build the forms with the bracing in place would have

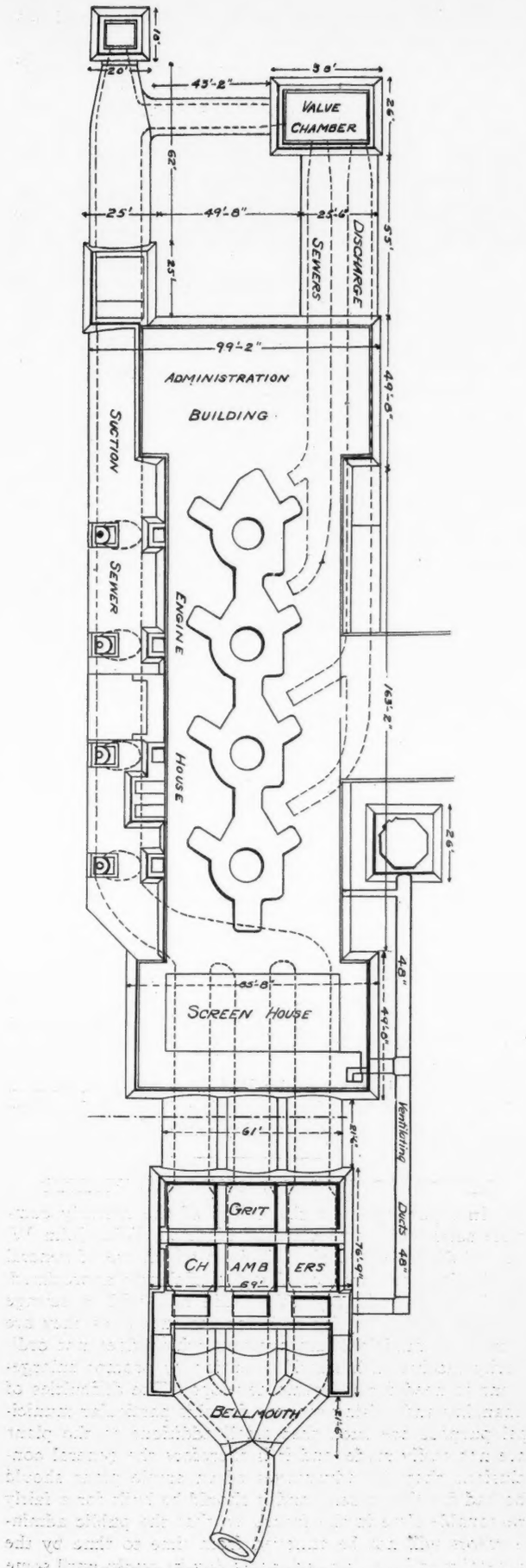
EXCAVATING ROCK IN SEWER TRENCH.



SEWER CONSTRUCTION IN ROCK.



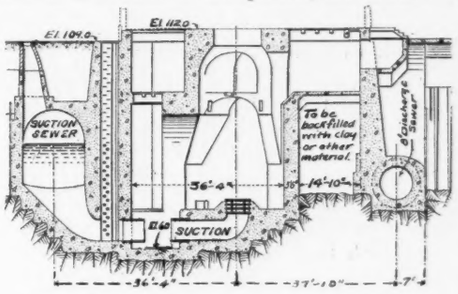
BRACING IN SEWER TRENCH.




GENERAL PLAN OF PUMPING STATION.

been a difficult and expensive method, so a series of smaller excavations, each about 60 feet in length, were made, forming a long trench around both sides and one end of the station. Inside these cofferdams, the side walls of the engine house are being carried up to the ground level. This leaves the earth inside the walls of the pump house to be excavated later. As soon as the side walls are finished (they are nearly completed now), the bracing will be removed from the cofferdam, the sheeting pulled up and the mud and clay allowed to slide against the concrete walls, except in those places where a movement of the ground would endanger existing structures or machinery. With these walls acting as a cofferdam, the interior of the pump house will be excavated by clam shell or orange peel buckets or by hand. Probably the buckets will be used in the soft mud, while the clay will be taken out by hand.

So far in this work, two travelers have been used on each side of the plant; the first one taking out the greater part of the excavation, driving piles, sheeting, etc., and the following one finishing the excavation, pulling sheeting and handling material and timbers. As soon as the excavation in a section is completed, the forms—built in



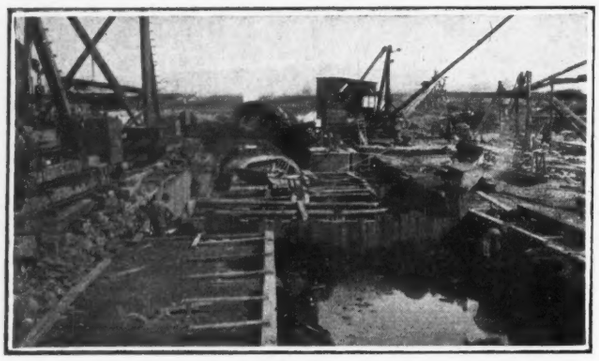

SECTION THROUGH ENGINE HOUSE.

advance in the carpenter shop—are put in place, the concrete poured, timbering and sheeting removed and the traveler moved forward to the next section.

As soon as the interior of the pump house is completed, two travelers, placed on the walls at the upper end, will make the excavation for the screen chambers. As soon as the concrete for these is set, the travelers will move forward. In this way the excavation for the grit chambers and bellmouth will be made successively. It is planned to do this by open cut method, as the excavation is not so deep as the pump house, the area is large for convenient braced trench work, and cofferdam construction would be more costly. The mud on top, when cut carefully, will stand vertical. A shelf of four or five feet will be left between the clay and the mud and the clay itself will be cut on a slope of about one to four.

At the other end of the pumping station, where the valve chamber, by-pass and discharge sewer are to be built, the cofferdam method will be used.

GENERAL VIEW OF PUMPING STATION CONSTRUCTION.

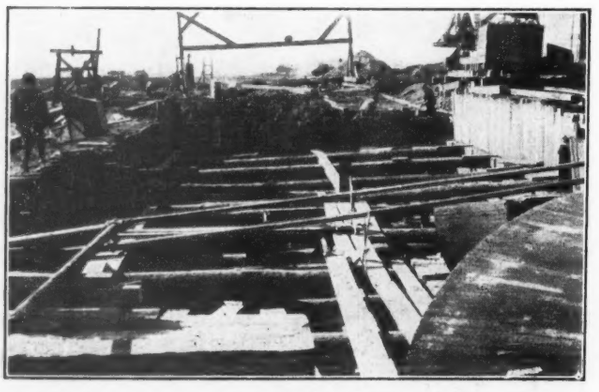


EXCAVATION FOR ENGINE HOUSE WALL.
Looking Northeast. Sheeting Guides in Foreground.

On the station construction itself, two general methods of excavation are employed. The marsh mud can be handled readily with clam shell or orange peel buckets, especially the latter, and these are used almost exclusively for taking out the mud. After six or eight feet of it has been removed, sheeting guides are placed on the ground outside the excavation and the laborers cut the sides of the excavation to conform to the outline of the cofferdam. Sheeting is then driven and braced and the buckets kept in operation until clay is reached. On the sewer trench, 2-inch tongue and groove sheeting was used; on the main plant, 3-inch, with 10x10 braces and rangers. The sheeting is driven by hand for the first few feet and then by steam hammer.

The red clay is usually taken out by hand as it is too stiff for the grab buckets to handle. One-yard buckets are lowered into the excavation, filled by the shovelers, hoisted out and dumped into V-body steel cars. The clay has to be loosened by picks before it can be shoveled and six men are usually employed in filling one bucket, three of whom use picks. A party of six men will fill a bucket in about 13 minutes. Though the buckets are rated as having a capacity of one yard, owing to the fact that the clay comes out in lumps and clods, they will not carry a full yard. The cost of removing this clay, including disposal, is about 60 cents a yard.

A small part of the material obtained from the excavations is used as backfill outside the walls of the pump house, but the larger part is dumped on the salt meadows. As most of the mud and clay will be used later to make a fill of about 2½ feet around the pumping plant, it is necessary to store it in accessible piles. The clay is easy to handle and dump, but the marsh mud is too soft and yielding to use as a support for dump car tracks and most of it is dumped from an elevated trestle built on piles. A hoisting engine furnishes the power and the cars are drawn up the incline one at a time and dumped from the top. Some of the shale and rock removed has been utilized in building roads across the meadows.

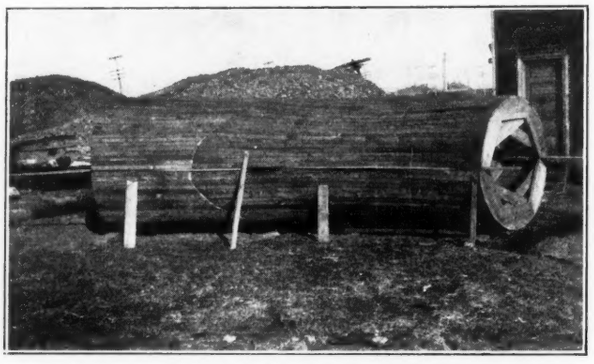


EXCAVATION FOR ENGINE HOUSE WALL.
Looking Southwest.

The concrete plant, which had to be built on piles, is constructed in duplicate. It is equipped with two Smith mixers, each having a capacity of 20 cubic yards per hour. Both mixers dump into the one chute, which leads to either skip of the double distributing tower, which, in order to reach all parts of the work, had to be made 127 feet high. The concrete plant had to be built on the skew so that both stone bins would be within reach of the 60-foot boom. Steam pipes and coils are used to heat the aggregate in cold weather.

With the exception of one time when an extremely high tide flooded the whole work and occasionally when quantities of surface water result from rain or snow, there has been very little trouble from water. Two 4-inch pumps and a couple of smaller ones have kept the work free from an excess of water.

The equipment on the job consists of one stationary and six traveling derricks equipped with Steubner 1-yard buckets, two Hayward orange peel buckets of 15 and 21 cubic feet capacity respectively, and one 21-cubic-foot clam shell, and Youngstown V-body steel dump cars of 30-inch gauge. Sheeting and piles are driven by three steam hammers—one McKiernan-Terry, one Hamilton and one National. There are four Lambert, two Lidgerwood and a National hoist; four pulsometers, two Cameron and two centrifugal pumps. Crushed stone is secured from the Commonwealth Quarry Company and the Bound Brook Crushed Stone Company, and sand from the Raritan Sand Co. Atlas and Edison Portland cements are used.



FORM FOR CURVED END OF DISCHARGE SEWER.

The work is being done by P. J. Moranti, Inc., with B. W. Fordham engineer in charge. Mr. Moranti also takes an active part in the construction work.

## DESIGNING SEWAGE DISPOSAL PLANTS.

In reporting upon the design of the recently complete sewage disposal plant of Madison, Wis., John W. Alvord discussed certain principles which are of general application, but are not always sufficiently appreciated. "It is particularly desirable," said he, "with a sewage disposal works, to plan well for the future, as they are a type of municipal improvement which does not ordinarily receive enthusiastic attention or prompt enlargement as need for the same develops. The difficulties of financing and raising moneys for this particular municipal purpose are such that small additions to the plant are not easily made, and it is therefore the general conclusions that the advantages of an ample plant should be had for the present, and it should be built for a fairly reasonable time in the future, so that the public administrators will not be annoyed from time to time by the necessity of financing and increasing its works until some

considerable expenditure becomes necessary. It seems to me, therefore, that it would not be out of place to now build a plant which would be capable of caring for the municipal wastes up to the year 1930, with such reasonable accuracy as they can at this time forecast."

Concerning the amount of sewage to be provided for, he says: "In cities similar to Madison there is a tendency toward a gradual increase in water consumption due to the more extensive use of sanitary appliances and industrial uses. This increase in well metered cities is relatively slow, however, and I would suggest, as an estimate for it, about five gallons per capita in daily consumption per decade." In 1911 the amount per capita in Madison was 87½ gallons, and he estimates 105 gallons for 1920 and 110 gallons for 1930. As the sewage in Madison has been pumped for years, and the water supply also is provided by pumping, the ratio between the two was easily ascertained. It was found that since 1904 the ratio of sewage pumped to water pumped has varied from 1.06 to 1.28, the latest records in the report showing the sewage as being 119 per cent of the water pumped. The additional 19 per cent (with undoubtedly another 5 or 10 per cent—possibly more—to balance the amount of the water supply not reaching the sewer) was probably almost entirely ground water leaking into the sewers. This is another illustration of what sewer engineers have in recent years known to be the case—that it is necessary to assume, in designing a sewerage system, that the amount of water to be provided for will ordinarily be greater than the water supply consumption. This, however, would probably be true in the majority of cities only where the sewers admitted ground water. In localities of the country where there is no ground water, or in case the sewers are made perfectly tight, the capacity of the system might probably be made approximately 25 per cent less than where sewers which are not tight are laid in water-bearing ground.

## DEPTH OF TRICKLING FILTERS

### Arguments For and Against Making Them More Than Seven Feet Deep, by Harrison P. Eddy, H. W. Clark and George W. Fuller.

In our issue of November 19, 1914, we published an abstract of a paper by George W. Fuller before the American Society of Municipal Improvements, in which he discussed the economic depth of trickling filters, concluding with the statement: "Taking everything into account, the writer believes that a sprinkling filter bed of not less than 6 feet and not more than 7 feet will, in the greatest number of cases, prove the most economical to use." This paper was discussed a few weeks ago before the Boston Society of Civil Engineers by Harrison P. Eddy and H. W. Clark, and later Mr. Fuller by correspondence replied to the criticisms of his paper.

Mr. Eddy presented some figures from experiments conducted during three months at Gloversville, N. Y., on 5 ft., 7 ft. and 10 ft. filters, others lasting from two months to one year at Worcester, Mass., on 5 ft., 7 ft. 6 in., and 10 ft. filters, and still others covering from one year to four years at the Lawrence Experiment Station. "The Gloversville experiments indicate that the 10-foot filter, although treating a greater quantity of nitrogen per cubic yard, produced nearly as good an effluent as the 7-foot filter and a better effluent than the 5-foot filter. The Worcester experiments indicate a similar result, and at times the 10-foot filter was producing a stable effluent at higher rates per cubic yard than the shallow filters. The experiments made at Lawrence, Mass., also indicate the same results, that up to a limit of depth of 10 feet the capacity of a trickling filter is directly proportional to its depth." Pooling may be greater on the deep filter because more sewage is applied per unit area of surface, and there is less air circulation; but on the other hand, the temperature is lowered less in winter.

Mr. Eddy then compares costs on a basis differing somewhat from Mr. Fuller's, using square yards of vertical face of walls rather than cubic yards, and varying the cost of distribution system in proportion to the area of filter rather than the cubic contents. Mr. Eddy also calculates that the cost of the floor per cubic yard of filter would decrease somewhat more rapidly as depth increases than does Mr. Fuller. Comparing Mr. Fuller's figures with a table prepared according to his own assumptions, Mr. Eddy finds that, while on Mr. Fuller's assumption the price per effective cubic yard varies only from $4.33 to $4.56, Mr. Eddy's figures show a range of price in the different depths from $3.60 to $4.54. He also makes the comparison in another way, giving the prices of filters of various depths capable of doing the same work as a filter one acre in area and 6 feet deep (assuming in each case equal effectiveness per cubic yard of stone). With the deeper filter, having less area, the floor system, underdrains, galleries and distributing system will cost less, while the walls will cost more. The figures indicate a cost for one acre of 6-foot bed of $43,984, the cost of the deeper filters of equivalent volume decreasing until that of a 10-foot filter is calculated as $34,926—a reduction in cost of slightly over 20 per cent.

In conclusion Mr. Eddy remarks: "It is unfortunate that there are no better data upon which to predicate an assumption as to the relative capacities per cubic yard of filtering media in deep and shallow filters. There can be no doubt that there is a practical limit to the economic depth of trickling filters. This limit will vary according to local conditions and must be computed for each case. There seems to the writer, however, much evidence that up to a certain limit, which in most cases where municipal sewage is to be treated will be as high as 8 or 10 feet, the capacities of the filters will be approximately uniform per cubic yard of filtering material."

Mr. Clark opens his discussion with the positive statement: "The maximum results in efficiency of purification and volume of sewage purified in trickling filter sewage purification are obtained when the filter is of considerable depth and is constructed of comparatively fine material. There is undoubtedly a maximum depth beyond which the additional efficiency obtained is not commensurate with the additional cost of construction, and which interferes with filter aeration, and a minimum depth below which economical depths of filtration cannot be obtained. In coordination with the depth, a filtering material should be selected that will have the greatest efficiency at that depth when the filter is operated at economical rates and yet be coarse enough to preclude clogging of the filter and, if possible, surface pooling."

Mr. Clark's conclusions are derived from experiments conducted at the Lawrence Experiment Station, which has been under his charge as chemist for a number of years. He refers to three filters having depths of 5, 8 and 10 feet respectively and operated for 5, 11 and 15 years. These filters received at different times sewages of varying strength. At times the 5-foot filter was operated at a rate too high to secure a stable effluent, while the 10-foot filter could have been operated at a higher

rate than the two million gallons per acre which was its average. (The average of the 5-foot filter was 1,465,000 gallons).

On May 1, 1913, four new trickling filters were put into operation to determine the effect of depth, these filters having depths of 4, 6, 8 and 10 feet respectively. Each was constructed of broken stone between ¾ inch and 1½ inches in size. All sewage applied to them was clarified by sedimentation. Attempt was made to operate the filters so that the effluents would contain about 1.5 parts of nitrates per hundred thousand, this being the amount of nitrification which previous experiments at the station had shown to be necessary in order to insure stable effluent in trickling filter purification. At the beginning, each filter was operated at a one million gallon per acre rate, following which the rate for the shallow filters was reduced and that for the deeper filters increased. During 1914 they were operated so as to give approximately uniform amounts of nitrates, the average rates per day being 332,700 gallons, 585,100 gallons, 1,801,000 gallons and 3,733,000 gallons respectively. But they were operated under ideal conditions, with such supervision and care as it is almost impossible to duplicate in practice. This, however, Mr. Clark does not consider to affect the comparative results. These apparently indicate not a less but a very much greater rate of filtration per cubic yard as the depth increases. He calculates that the rates per foot of depth giving equal nitrification and stability results would be 100,000 gallons for the 4-foot filter, 125,000 for the 6-foot, 200,000 for the 8-foot and 300,000 for the 10-foot; in other words, that a 10-foot filter would have three times the capacity per cubic foot that a 4-foot filter would have and more than twice as much as a 6-foot filter.

In replying to these discussions, Mr. Fuller calls attention to the fact that, while Mr. Eddy's views are based upon experimental operation at three plants, he has based his own partly upon general observation of European and American filters on a practical scale, but more particularly upon data from experimental filters at Baltimore and the results obtained from the first large sprinkling filter on a working scale in this country, that at Reading, Pa. Moreover, he finds that the prevailing practice is to build these filters from 5 to 8½ feet deep, most of those in this country being 6½ to 7 feet, with the exception of Mr. Eddy's filter at Fitchburg, Mass. This being the case, he feels that the burden of proof rests with those who would make the departure from the normal prevailing practice.

In making their comparisons, Mr. Fuller used as a measure the relative stability of oxygen-consumed results, whereas Mr. Eddy used the percentage of samples showing the effluent to have been stable, measuring the strength of the sewage in terms of unoxidized nitrogen, including free ammonia and organic nitrogen. "The uncertainties attending this (Mr. Eddy's) method of rating the work accomplishing may readily disguise the well known fact that the upper portions of the filters generally do more work than the lower portions." In the Lawrence results there is a higher regard for nitrification than in most other places. At Reading, for instance, the sprinkling filter effluents were uniformly stable and did not on an average contain half as much nitrates as the 1.5 parts obtained at Lawrence; while the Plainfield filters contained only about one-fourth as much, and during the summer months the undiluted effluent was highly putrescible but seldom, if ever, during the eight colder months of the year. "Nitrates unquestionably promote the stability of the effluents on coase grain filters, but where the effluent is well supplied with dissolved oxygen there are grave doubts in the mind of the writer as to whether it is economically practicable to design and operate a sprinkling filter so as to promote relatively high nitrification."

The age, strength and character of the applied sewage are important factors. That at Baltimore, Reading and Plainfield was fresh, while that used at Lawrence is stale sewage and more or less advanced along the lines of anærobic decomposition. The fact that the Worcester and Gloversville sewages are mixed with trade wastes may have substantial significance.

In the absence of any definitely accepted method of comparing purification effected by filters, Mr. Fuller refers to the method proposed by the Royal Commission and devised by Dr. McGowan. This is an attempt to put in numerical form the various elements entering into the strength of a sewage applied to a filter and the effluent from the filter, and, combining these figures with the rate of dosing the sewage, obtain a definite numerical purification figure suitable for comparative work. The strength of the sewage applied is measured by the formula

$$S=(\text{Ammon. N} + \text{Organic N}) \times 4.5 + (\text{Oxygen absorbed in 4 hours}) \times 6.5$$

Nitrogen and oxygen are to be expressed in parts per hundred thousand.

The strength of a filtered effluent is measured as follows:

$$\text{Strength}=(\text{Ammon. N} + \text{Organic N}) \times 4.5 + (\text{Vol. matter of suspended solids}) \times 2 - (\text{nitric nitrogen}) \times 3.$$

Dr. McGowan would then consider the unit of purification per cubic yard of material equal to the difference in strength between the influent and effluent, multiplied by the gallons of sewage per cubic yard of material treated per day.

The theory of this is that the strength of either influent or effluent is equal to the amount of oxygen required to completely oxidize the sewage; a deduction being made in the case of the effluent for oxygen present in the form of nitrates by deducting three times the nitric nitrogen. In a later report, however, Dr. McGowan stated that in calculating the unit of purification per cubic yard of filter, he thinks credit should not be given for the nitrate remaining in the effluent.

Mr. Fuller has made calculations upon the Gloversville, Worcester and Lawrence experiments by use of this formula, and in his written reply gives a series of tables showing the results of these calculations. By this method he finds from the Gloversville tests that the purification effected by the 10-foot filter was 2,060 units per cubic yard per day; by the 7-foot filter, 2,600 units; and by the 5-foot filter, 3,130 units. In Worcester, a 5-foot filter showed a purification of 5,400 units, while the two 7½-foot filters showed 5,000 and 4,950 units respectively. In the Lawrence tests, two 10-foot filters gave 4,280 and 4,680 units respectively, two 8-foot filters gave 4,830 and 3,160 respectively, and the 5-foot filter gave 6,400 units per cubic yard. Unfortunately, in making these calculations Mr. Fuller was compelled to make certain assumptions or to omit certain considerations because the data necessary for making them were not available and probably had not been taken. If the correctness of the McGowan method be accepted, and the making of these necessary assumptions and omissions do not vitiate the results, these calculations would appear to indicate a higher rather than a lower rate of purification per cubic yard for the shallow as compared with the deep filters.

Discussing the matter of construction costs, he concedes that if a deep bed will produce stability or nonputrescible condition in an equal amount of sewage per cubic yard of bed as a shallow one, there is no doubt that the deeper beds are cheaper than shallower ones. But he states that this cheapness might be more than

balanced by the greater trouble with surface clogging. As to the cost of distributing system, he believes that this will probably depend upon both area and volume. As to the unit prices, "there is nothing that can be added," said he, "except that they are in accordance with the writer's repeated experiences"; these including recent lettings at Plainfield, Baltimore, Reading, Columbus and Atlanta.

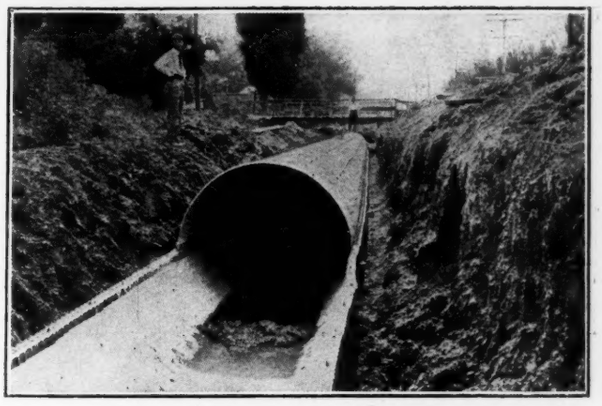
## SEWERAGE IN SALT LAKE

### Extensive Construction of Concrete Pipe and Vitrified Pipe Sewers—Also Some Steel, Iron and Wood Stave—Pumping Sewage.

Salt Lake City, Utah, has had some interesting sewerage and sewage disposal problems to solve, several of which have been described in Municipal Journal. During the past two or three years the chief work has been that of extending the sanitary system and constructing storm sewers. In his report for the year 1913, city engineer Sylvester Q. Cannon stated that there were, on January 1, 1914, 185½ miles of sewer, of which 131 miles were 8-inch pipe and about 20 miles were 10-inch; while during the year 1914 there were laid nearly 10 miles of sewer varying from 8-inch to 30-inch. Of this amount 5,868 ft. were main line sewer, of which 4,012 feet were of machine-made concrete pipe and the balance of vitrified clay pipe; while the remaining 8 or 9 miles were laterals of small vitrified clay. This use of concrete or so-called cement pipe was comparatively new in Salt Lake, only three or four miles of it having been laid before 1913.

During the year 1914 extensive designs and plans were worked out for 64 miles of sewers in the east and southeastern part of the city, and a contract for the same amounting to $671,800 was let in September, and the work was well under way at the close of the year. Another section in the northwestern part of the city of six miles of sewers amounting to $57,900 was let in December and the work begun shortly afterward.

In his report for 1914 the city engineer states that during that year 65,917 feet of lateral extensions were laid and 1,657 feet of main sewer; a total of 12.8 miles. Of this total 35,939 feet were of machine-made concrete pipe and 31,635 feet of vitrified clay pipe, both of local manufacture. This brings the total mileage of sanitary



CORRUGATED STEEL SEWER, 60 INCH.

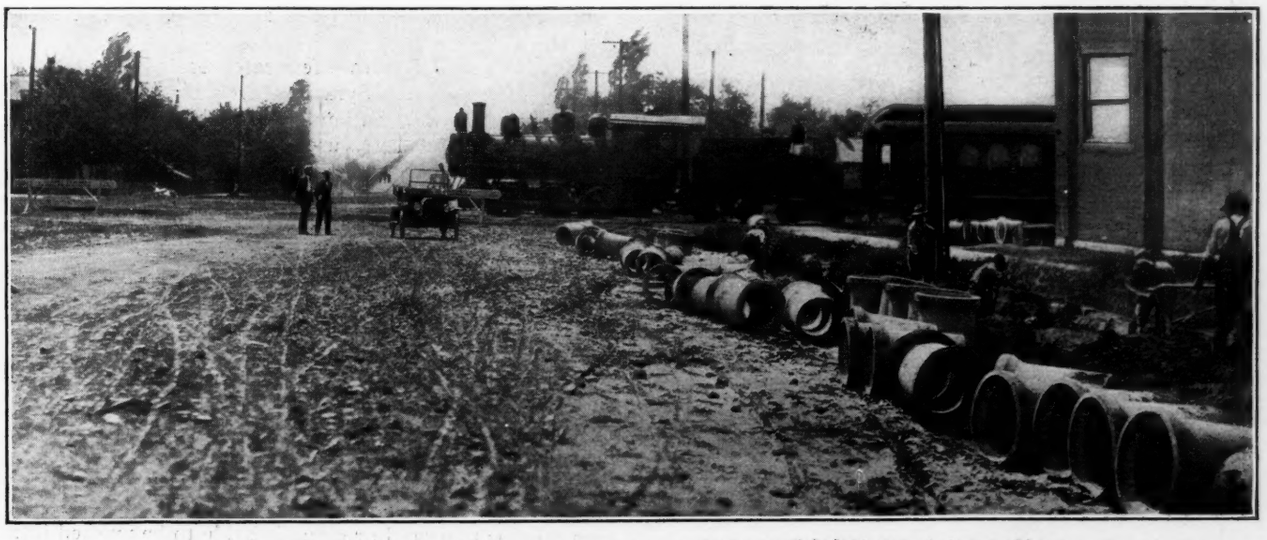
sewers in operation in the city to January 1, 1915, to 202.8 miles, and that of storm sewers to 7.4 miles.

During 1914 the amount of storm sewers in service in the city was doubled, 19,800 feet having been laid at a cost of $53,573. The storm sewer system now comprises about 0.7 mile of reinforced concrete 4x5 sewer, and concrete and vitrified pipe sewers varying from 12 inches to 30 inches. During the year a concrete conduit was built to replace an old irrigation canal.

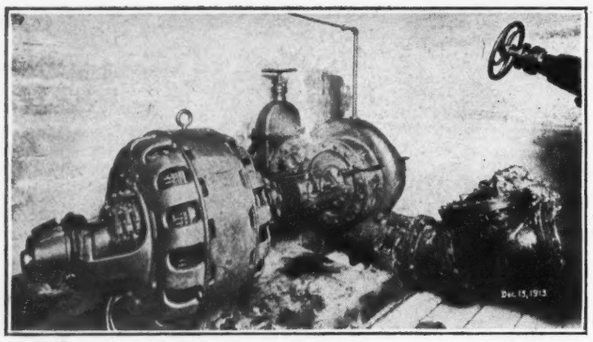
During 1913 an irrigation canal, that on State street, was replaced with 24 and 30-inch concrete pipe, and in the same year a 30-inch concrete storm sewer was begun on Ninth and Eleventh avenues, the work on these being continued and completed in 1914.

In the storm sewer system vitrified pipe has not been used for anything larger than 15-inch, concrete being used for the larger sizes. In the house sewer system vitrified pipe has been used as large as 24-inch, and concrete pipe for as small as 10-inch. Special conditions have called for cast iron and steel pipe, there being one stretch of 586 feet of 8-inch cast iron and another of 110 feet of 24-inch cast iron. A galvanized steel flume 36 inches in diameter was used for about half a mile of sewer outlet, and 4,525 feet of 24-inch wood stave pipe was used in the outlet of the intercepting sewer.

The cost of cleaning out and flushing the sewer system throughout the year averaged $19.60 per mile of sewers for the whole system, and $10.10 per mile was the cost of general maintenance. Considerable trouble was experienced last year on account of obstructions in the 4-inch vitrified pipe used for house connections, due to



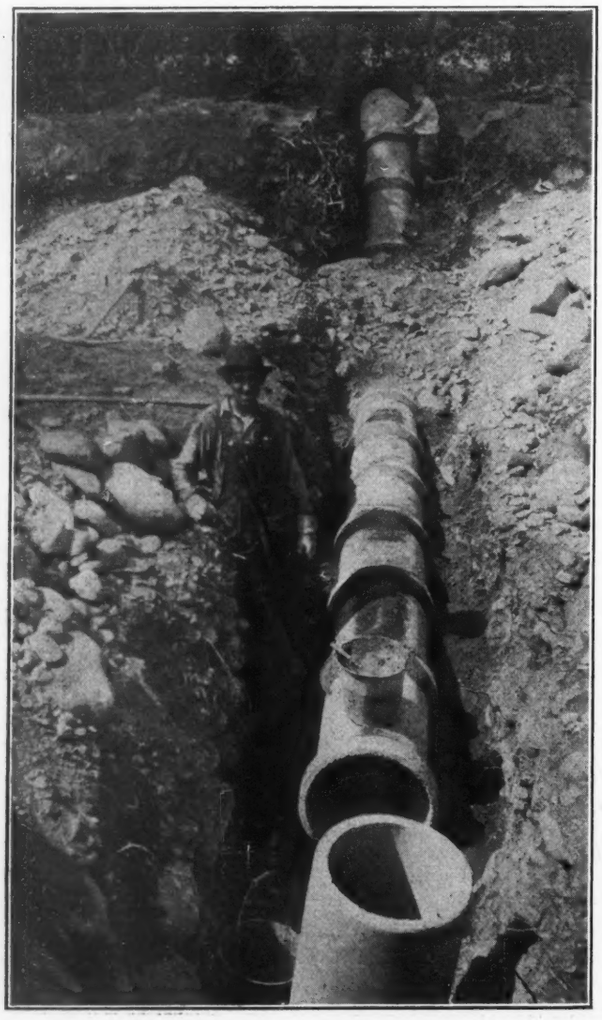
21-INCH CONCRETE STORM SEWER LAID UNDER RAIL ROAD TRACK.



NEW UNIT, INTERCEPTING SEWER PUMPING STATION.

poor pipe and poorly made joints which permit the roots of trees to find their way into the pipe.

Owing to the topography of the surrounding country it is necessary to pump part of the sewage of Salt Lake, which is collected by an intercepting sewer. The average discharge of this pump in 1913 was 3,932,000 gallons per day, the lift being 68 feet. The average cost of pumping was $25.96 per day, or $6.61 per million gallons, or 9.7 cents per million gallons per foot head. On account of the steady increase in the amount of sewage which has reached the intercepting sewer, it was necessary to increase the pumping capacity during 1913, and a Worthington double suction, horizontal centifrugal 12-inch pump with a rated capacity of 5,200 gallons per minute under 68-foot head was installed, direct connected to a 150 horse-power Westinghouse phase-wound motor, 440 volt, three-phase, 60 cycle alternating current, with a speed of 1,120 revolutions per minute.



INVERTED SIPHON OF 15-INCH CONCRETE PIPE.

## COMMENTS ON CATCH BASINS

### City Engineers Tell Why They Use or Do Not Use Them on Sewer Inlets, and Under What Conditions—Special Constructions.

Among the hundreds of replies which city engineers and other officials have kindly sent to the inquiries made by us during the past month concerning sewerage matters, were a number of comments or explanations of the city's practice or the writer's opinions as to the use of catch basins in connection with storm water inlets. Of these we have endeavored to give a synopsis in the following paragraphs:

Catch basins are used with inlets only where the sewer grades are flat in Alhambra, Cal.; Rutherford, N. J.; Shawnee, Okla., and Portland, Ore.

They are used with inlets discharging into combined sewers, but not those discharging into storm sewers in Oakland, Cal.; Stillwater, Minn.; Lakewood O., and Lorain, O. They are used on small storm sewers by Rockville, Conn., and Boone, Ia.

They are used on basins connected to house sewers by Waterbury, Conn., and Little Falls, N. Y.

They are used on basins except on paved streets by Gainesville, Fla.; Saginaw, Mich.; Faribault, Minn.; Camden, N. J., and Allentown, Pa.

They are used only on paved streets (plain inlets on others) in Lead, S. D.; on all but those in outlying districts in Red Wing, Minn.

Plain inlets connected to combined catch basin and manhole in the roadway are used in Kewanee, Ill. (4 ft. drop in manhole bottom, porous so as to drain out), Austin, Minn.; Billings, Mont.; Great Falls, Mont.; Oswego, N. Y. (a few), and Sheridan, Wyo. One catch basin at a corner, with inlets leading to it, is the practice at New Haven, Conn. (a few); Monroe, Mich.; Oswego, N. Y. (a few); Fostoria, O., and Walla Walla, Wash. Atlantic City, N. J., and Sheridan, Wyo., place a catch basin in the middle of the street intersection, discharge all inlets into this and it into the sewer. St. Paul, Minn., has a few plain inlets connected direct to a sewer manhole.

Urbana, Ohio, does not use catch basins, but the bottoms of manholes are lowered and dirt caught at these points.

Wilmington, Del., uses a few catch basins near the flat grade outlet sewer. Syracuse uses them where they empty into a sewer, but not where they discharge into a stream. Delaware, O., uses them when some distance from the river or other outlet, but not otherwise; also considers them more advisable where the sewer grade is flat than where steep. Carbondale, Pa., uses them where flat grades connect to lines of steady flow, and on all dirt roads. Miners Mills uses them except where the inlets connect to large sewer with only short runs to the outlet.

Ann Arbor, Mich., uses catch basins "only where sandy soil conditions require it." Battle Creek, Mich., only on steep grades with sand and gravel streets. Montclair, N. J., uses them on all new work and is gradually changing to them on old; "it is cheaper to install new catch basins than to clean a filled sewer pipe every two or three months, as occurs here very often." Plainfield, N. J., uses them where sand or stone is liable to be washed into

sewers with flat grades. Dayton, O., uses them on gravel streets having steep grades, where the grade of the sewer becomes flat as it approaches the outlet. Sioux Falls, S. D., uses them to catch storm water from steep grades where there is considerable wash. Charleroi, Pa., finds that in the whole downtown section, which is paved and fairly level, very little dirt enters the inlets; but on steep hillside streets a heavy rain will fill a basin with dirt.

The city engineer of Dothan, Ala., George E. Heller, states that sewer inlets in that city are designed without any catch basins, as water standing in them permits the breeding of mosquitoes and other insects which breed in stagnant water. He also finds that in a city of that size the street cleaning department cannot be relied upon to keep these basins free from dirt, and in a short time they are operating as if there were no drop bottom. On account of the intense rate of rainfall in that region it is difficult to get water into the sewers fast enough, and 10 per cent. of the inlets are in the middle of the block, in addition to those on the corners. The soil is a sand-bearing red clay, and the sewer has sufficient fall (9 inches per hundred feet) to carry all of the dirt to the outlet. The sand, however, has produced an appreciable scouring effect on some of the concrete outfall sewers.

Jackson, Miss., has few catch basins, "as they would breed mosquitoes in summer."

In Poplar Bluff, Mo., catch basins, although cleaned once a week, about one cubic yard of dirt being removed, are continually stopping up, due to the street flushing machine, there being no sweeping done. Benton Harbor, Mich., does not use any regular catch basins. It finds that the street flushers, used daily on paved streets, keep the inlets clean.

Norfolk, Neb., and Omaha, Neb., do not need catch basins on account of good grades in the sewer.

Reading, Pa., uses catch basins, "except in instances where drainage during the normal interval of fair weather is insufficient to prevent foul odors due to stagnant contents." Scottdale, Pa., uses catch basins on all its recent inlets, provided with stench plates. Dixon, Ill., uses catch basins for practically all inlets requiring traps. Those which are tight with elbow traps give some trouble.

Ogdensburg, N. Y., has catch basins on all inlets except a few old ones, and is lowering the bottoms of these. Jackson, Tenn., J. L. Williams, city engineer, considers that they should be used at all inlets. Des Moines, Iowa, has catch basins for all inlets, which are cleaned by forcing the dirt into the sewer by water from a fire hose.

Pittsburg, Kan., finds that nothing is caught by the catch basins but brickbats and rubbish, all dirt being washed through the sewer.

Lewiston, Idaho, has omitted catch basins from the inlets of one of its sewer districts recently constructed, but has not yet had time to try out the plan.

John McNeal, city engineer of Columbia, S. C., does not consider catch basins necessary unless the main drain is 12 inches diameter or less, "and even in this case it would probably be more economical to flush the main drain in order to keep it clean. In any case, a catch basin seldom retains more than a small percentage of the dirt reaching it, as a heavy storm almost immediately fills it with dirt to its capacity and the balance is washed into the main drain. In accordance with this idea, I have converted many catch basins into inlets." Pana, Ill., uses catch basins "under no conditions now." Minneapolis, Minn., uses catch basins only in some of the older inlets.

# SEWERAGE STATISTICS FOR 1914

**Data from About Four Hundred and Fifty City Engineers, Giving Amounts of Sewers of Various Materials and Sizes Constructed Last Year—Also Location, Construction and Cleaning of Inlets.**

In the following tables are given figures which we have obtained through the kind cooperation of city engineers and other officials in charge of sewer work, stating the amounts of sewers of various kinds and sizes which were constructed last year in nearly four hundred and fifty cities. A number of cities (not mentioned) report no work done; and there are probably several hundred who did not reply at all for the reason that they had no figures of work done to give us.

In addition we received and publish in table No. 5 data concerning plain inlets and catch basins; and comments on the use of catch basins are given in the article immediately preceding this and are discussed on the editorial page. These show that the majority of cities use catch basin inlets exclusively, although quite a number use plain inlets in all cases, and several use both kinds, many of them naming the conditions under which each is used. (The last we believe to be the correct practice in most cities, although some find catch basins unnecessary under any conditions found in their cities. We believe there are few, if any, cities which should use catch basins at all inlets.)

As to location of inlets, about 40% of all cities reporting on this point place these at the curved corner stone or the intersection of the curb lines; about 14% where the property line intersects the curb; 12% just beyond the crosswalks; 7% back of the property line extended; and the remaining 27% at various points between intersections of curb line and property line extended. Of those which place the inlet beyond the crosswalk, many if not most do so to prevent the water from flowing by the crossing, and probably the majority raise the roadway pavement at the curb to the level of the sidewalk ("flush crossing"), or at least sufficient to give only a 2-inch or 3-inch curb at this point. This requires two inlets in place of the one which would be provided if the opening were at the curb intersection; and this saving in expense is one of the advantages of the latter location. An objection to the flush or nearly flush crossing is the possibility that vehicles will cross the sidewalk pavement in making a short turn.

The number of sewage pumping plants in the country is increasing, partly because of the installation of treatment plants which require some head for operation. Brief descriptions of such plants in seventy-five cities are given in an article following the tables, some of the cities having several plants. It is noteworthy that almost every city reports having no trouble with these plants, and only one or two have experienced any serious difficulty. Practically all use centrifugal or volute pumps, and the majority are motor operated; and a majority of the latter are started and stopped automatically by means of a float operating a switch.

The amounts of sewer constructed in 1914, as reported by these cities, were as follows: Vitrified pipe—5,065,500

*(Continued on page 357.)*

## TABLE NO. 1.—LINEAL FEET OF VITRIFIED PIPE LAID IN 1914.

| City— | Less than 10-inch. | 10 to 15-inch. | 16 to 24-inch. | Larger than 24-inch. |
|---|---|---|---|---|
| **Alabama:** | | | | |
| Montgomery | 3,614 | 4,492 a | .... | ... |
| **California:** | | | | |
| Berkeley | 6,500 | 6,143 | 6,638 | ... |
| Eureka | 8,000 | .... | .... | ... |
| Los Angeles | 502,100 i | .... | .... | ... |
| Oakland | 44,974 | 6,592 | 4,553 | ... |
| Pasadena | 3,406 | .... | .... | ... |
| Redlands | 4,000 | .... | .... | ... |
| Riverside | 5,836 | .... | .... | ... |
| San Bernardino | 8,723 | .... | .... | ... |
| San Diego | 46,280 | 1,813 | .... | ... |
| Santa Ana | 19,800 | .... | .... | ... |
| Santa Rosa | 3,000 | 10,500 | .... | ... |
| **Colorado:** | | | | |
| Colorado Springs | .... | .... | 600 | ... |
| Denver | 74,860 | 5,682 | 191 | ... |
| **Connecticut:** | | | | |
| Ansonia | 9,300 | 2,800 | .... | ... |
| Bridgeport | 13,152 | 11,068 | 3,865 | 856 |
| Danbury | 400 | 1,800 | 470 | ... |
| Derby | 230 | 310 | .... | 350 |
| Greenwich | 13,427 | .... | .... | ... |
| Hartford | 5,476 | 13,278 | 6,683 | ... |
| Meriden | 1,772 | .... | .... | ... |
| Middletown | 11,510 | 4,477 | .... | ... |
| New Haven | 579 | 9,336 | 10,356 | ... |
| Rockville | 500 | .... | .... | ... |
| Wallingford | 1,000 | 500 | 3,550 | ... |
| Waterbury | 5,203 | 828 | .... | ... |
| **Delaware:** | | | | |
| Wilmington | 700 | 9,100 | 3,900 | ... |
| **Dist. of Columbia** | 77,170 b | .... | .... | ... |
| **Florida:** | | | | |
| Gainesville | 7,900 c | .... | .... | ... |
| Pensacola | 1,000 | .... | 1,135 | 400 |
| **Georgia:** | | | | |
| Athens | 9,900 | 6,330 | .... | ... |
| Atlanta | 86,592 b | .... | .... | ... |
| Brunswick | 8,000 | 1,800 | .... | ... |
| Dublin | 6,000 | 1,000 | .... | ... |
| Newnan | 1,200 | .... | .... | ... |
| Thomasville | 5,000 | .... | .... | ... |
| Valdosta | 3,000 | 7,200 | 3,400 | ... |
| **Idaho:** | | | | |
| Boise | .... | 1,572 | 4,285 | ... |
| **Illinois:** | | | | |
| Alton | 65,416 | 28,024 | .... | ... |
| Bloomington | 1,278 | 5,920 | 2,226 | ... |
| Cairo | 9,160 | 887 | .... | ... |
| Chicago | 325,504 m | .... | .... | ... |
| Charleston | .... | 1,300 | .... | ... |
| Chicago Heights | 86,293 | 22,507 | 26,991 | ... |
| Collinsville | .... | 3,200 | .... | ... |
| Decatur | 1,600 | 11,700 | 3,000 | ... |
| De Kalb | 55,368 | 19,630 | 9,371 | ... |
| Dixon | 8,125 | 6,710 | 746 | 630 |
| East St. Louis | 5,230 d | .... | .... | ... |
| Evanston | 5,016 | 1,503 | .... | ... |
| Freeport | 19,000 e | .... | .... | ... |
| Galesburg | .... | 1,346 | .... | ... |
| Herrin | .... | 1,960 | 300 | ... |
| Hinsdale | .... | 2,000 | .... | ... |
| Kewanee | 1,800 | 5,800 | .... | ... |
| Lyons | .... | 2,600 | 2,200 | ... |
| Mattoon | .... | 14,860 | 3,420 | 3,300 |
| Moline | 12,291 | 1,090 | 2,627 | 255 |
| Peoria | 10,530 | 21,730 | 10,100 | 700 |
| Taylorville | 10,320 | 15,985 | .... | ... |
| Waukegan | 136 | 150 | .... | ... |
| **Indiana:** | | | | |
| Anderson | 5,105 | 1,370 | .... | ... |
| Connersville | 2,000 | 5,000 | .... | ... |
| Crawfordsville | 600 | .... | .... | ... |
| Elkhart | 18,540 | 7,293 | .... | ... |
| Goshen | .... | 590 | .... | ... |
| La Porte | .... | 3,549 | 2,103 | ... |
| Marion | .... | 4,902 | 2,286 | 1,646 |
| Muncie | .... | 3,166 | .... | ... |
| Peru | .... | 4,600 | .... | ... |
| Portland | 750 | 5,469 | 1,622 | 706 |
| Shelbyville | .... | 1,100 | 600 | ... |
| South Bend | .... | 22,875 | 20,237 | ... |
| Terre Haute | 460 | 18,380 | 12,125 | ... |
| **Iowa:** | | | | |
| Boone | .... | 3,000 | .... | ... |
| Burlington | 24,678 f | .... | .... | ... |
| Cedar Falls | 2,585 | 375 | .... | ... |
| Cedar Rapids | 17,588 | 3,548 | 1,539 | ... |
| Clinton | 689 | 2,385 | .... | ... |
| Council Bluffs | 20,140 | 9,276 | 23,639 | 2,843 |
| Davenport | 32,000 g | .... | .... | ... |
| Des Moines | 121,385 b | .... | .... | ... |
| Grinnell | 1,200 | .... | .... | ... |
| Keokuk | 4,122 | 120 | 975 | 2,845 |
| Marshalltown | 6,944 | 1,456 | .... | ... |
| Mason City | 40,337 | 4,383 | 3,339 | 2,539 |
| Oelwein | 4,665 | .... | .... | ... |
| Oskaloosa | 7,200 | .... | .... | ... |
| **Kansas:** | | | | |
| Chanute | 300 | .... | .... | ... |
| Independence | 900 | .... | .... | ... |
| Manhattan | 480 | .... | .... | ... |
| Ottawa | 5,320 | .... | 900 | ... |
| Pittsburg | 14,155 | .... | .... | ... |
| Rosedale | 9,270 | 2,775 | .... | ... |
| Salina | .... | 7,900 | 480 | 2,525 |
| Topeka | 36,000 | 10,950 | 2,692 | 550 |
| Wichita | 9,000 | .... | .... | ... |
| **Kentucky:** | | | | |
| Owensboro | 300 | 1,800 | .... | ... |
| **Louisiana:** | | | | |
| Alexandria | 24,887 | 4,336 | 4,397 | ... |
| **Maine:** | | | | |
| Augusta | 955 | 904 | 80 | ... |
| Waterville | 2,438 | 76 | .... | ... |
| **Maryland:** | | | | |
| Frederick | 1,106 | 2,816 | 2,542 | ... |
| **Massachusetts:** | | | | |
| Adams | 1,800 | 1,485 | .... | ... |
| Boston | 16,940 | 71,703 | 18,140 | 117 |
| Brookline | 5,812 | 11,370 | 1,888 | ... |
| Cambridge | 11,090 i | .... | .... | ... |
| Clinton | 1,913 | 1,054 | .... | ... |
| Concord | 478 | .... | .... | ... |
| Fairhaven | 1,750 | .... | .... | ... |
| Fitchburg | 5,190 | 1,928 | 3,746 | ... |
| Franklin | 41,700 | 12,400 | 1,500 | ... |
| Grafton | .... | 600 | .... | ... |
| Greenfield | 4,211 | 1,311 | .... | ... |
| Haverhill | 3,013 | 2,058 | 1,009 | ... |
| Lawrence | .... | 6,774 | 1,198 | ... |
| Leominster | 64,704 | 90,169 | 6,545 | ... |
| Lynn | 4,713 | 1,235 | .... | ... |
| Malden | 6,106 | 1,894 | 314 | ... |
| Milton | 6,000 | 250 | .... | ... |
| Newton | 13,728 d | .... | .... | ... |
| North Adams | 150 | 2,510 | 442 | ... |
| North Andover | 956 | .... | .... | ... |
| North Attleboro | 1,240 | .... | .... | ... |
| Norwood | 2,621 | .... | .... | ... |
| Quincy | 27,984 b | .... | .... | ... |
| Revere | 4,680 | 3,125 | 442 | ... |
| Southbridge | 3,800 | .... | .... | ... |
| Springfield | 245 | 16,198 | 5,320 | ... |
| Stoneham | 100 | .... | .... | ... |
| Taunton | 13,212 | 3,885 | 703 | ... |
| Wakefield | 2,100 | .... | .... | ... |
| Waltham | 1,811 | 1,271 | 462 | ... |
| Westfield | 1,788 | 1,006 | .... | ... |
| Worcester | 31,258 b | .... | .... | ... |
| **Michigan:** | | | | |
| Ann Arbor | 26,700 | 3,500 | 1,300 | ... |
| Battle Creek | 27,471 f | .... | .... | ... |
| Benton Harbor | .... | 1,300 | 660 | ... |
| Coldwater | 2,548 | .... | .... | ... |
| Escanaba | 1,000 | .... | .... | ... |
| Flint | 55,405 | 30,980 | 17,663 | ... |
| Grand Rapids | 29,588 | 1,767 | 108 | ... |
| Hancock | 1,100 | .... | 200 | ... |
| Hillsdale | 2,750 | 1,200 | .... | ... |
| Kalamazoo | 19,281 | 5,568 | 4,160 | ... |
| Ludington | 1,350 | 850 | .... | ... |
| Manistee | 552 | 748 | .... | ... |
| Monroe | 826 | .... | .... | ... |
| Pontiac | 15,000 | 3,000 | 5,000 | ... |
| Saginaw | .... | 3,014 | 426 | ... |
| **Minnesota:** | | | | |
| Albert Lea | 1,200 | .... | .... | ... |
| Austin | 4,863 | 1,008 | .... | ... |
| Chisholm | 5,616 | 8,088 | 1,631 | 469 |
| Faribault | 473 | 1,559 | 775 | ... |
| Fergus Falls | .... | 2,700 | 800 | 400 |
| Mankato | 1,407 | 2,790 | 410 | ... |
| Minneapolis | 1,913 | 47,446 | 30,215 | 13,046 |
| New Ulm | .... | 4,300 | 450 | ... |
| Owatonna | 2,987 | 1,700 | 490 | 884 |
| Redwing | 2,451 j | .... | .... | ... |
| Rochester | 9,341 | 3,314 | .... | ... |
| St. Cloud | 8,419 | 4,802 | .... | ... |
| St. Paul | .... | 81,000 | 10,900 | 11,900 |
| Stillwater | 3,813 | 4,882 | 604 | ... |
| Virginia | 16,185 d | .... | .... | ... |
| Winona | 970 | 2,009 | .... | ... |
| **Mississippi:** | | | | |
| Hattiesburg | 908 | .... | .... | ... |
| Jackson | 5,250 | .... | .... | ... |
| Meridian | 10,000 | .... | .... | ... |
| **Missouri:** | | | | |
| Brookfield | 3,315 | .... | .... | ... |
| Carthage | 1,700 | .... | .... | ... |
| Fulton | 750 | .... | .... | ... |
| Hannibal | 41,000 | .... | .... | ... |
| Kansas City | 74,550 f | .... | .... | ... |
| Kirksville | 5,150 k | .... | .... | ... |
| Mexico | 525 | 1,090 | .... | ... |
| Moberly | 380 | 760 | .... | ... |
| Poplar Bluff | 21,800 | 9,500 | 2,800 | ... |
| St. Charles | 855 | .... | .... | ... |
| Sedalia | 10,500 | 11,880 | .... | ... |
| **Montana:** | | | | |
| Billings | 29,000 | 2,640 | .... | ... |
| Bozeman | 5,200 l | .... | .... | ... |
| Great Falls | 15,056 | .... | .... | ... |
| Helena | 2,600 | 650 | 1,050 | ... |
| Kalispell | 333 | 5,093 | .... | ... |
| **Nebraska:** | | | | |
| Columbus | .... | 3,765 | 4,408 | 688 |
| Fairbury | 720 | .... | .... | ... |
| Gothenburg | 2,850 | .... | .... | ... |
| Grand Island | 300 | 1,700 | 550 | ... |
| Lincoln | 6,154 | 2,712 | 1,915 | ... |
| Norfolk | 2,000 | 7,000 | 2,000 | ... |
| Omaha | 21,250 | 23,047 | 14,277 | 143 |
| **New Hampshire:** | | | | |
| Berlin | 500 | 1,588 | 900 | ... |
| Concord | 194 | 1,658 | 1,174 | ... |
| Dover | .... | 592 | .... | ... |
| Keene | 131,797 | 35,374 | 1,162 | ... |
| Laconia | 472 | .... | .... | ... |

## TABLE NO. 1.—LINEAL FEET OF VITRIFIED PIPE LAID IN 1914.—Continued.

| City— | Less than 10-inch. | 10 to 15-inch. | 16 to 24-inch. | Larger than 24-inch. |
|---|---|---|---|---|
| **New Jersey:** | | | | |
| Asbury Park | 1,824 | .... | .... | ... |
| Atlantic City | .... | 7,214 | 3,732 | ... |
| Millville | 1,600 | .... | .... | ... |
| Montclair | 7,986 | .... | .... | ... |
| Morristown | 400 | .... | .... | ... |
| Newark | 15,662 b | .... | .... | ... |
| Plainfield | .... | 126 | 265 | 7,060 |
| Rahway | 3,000 | .... | .... | ... |
| Ridgewood | 8,840 | .... | .... | ... |
| Rutherford | 11,728 | .... | 1,198 | ... |
| Westfield | 4,000 | .... | .... | ... |
| **New Mexico:** | | | | |
| Roswell | 2,000 | .... | .... | ... |
| **New York:** | | | | |
| Albany | .... | 31,800 | 1,152 | 5,471 |
| Binghamton | 13,498 | 8,106 | 2,248 | ... |
| Corning | 3,398 | 211 | .... | ... |
| Dunkirk | 1,380 | .... | .... | ... |
| Elmira | .... | 15,400 | .... | ... |
| Hoosic Falls | 35,000 | .... | .... | ... |
| Hudson | 200 | 1,450 | .... | ... |
| Jamestown | 13,000 | .... | .... | ... |
| Kingston | 250 | .... | .... | ... |
| Little Falls | 1,200 | .... | .... | ... |
| New York (Manhattan) | 3,055 i | .... | .... | ... |
| New Rochelle | 7,766 | 4,389 | 3,717 | ... |
| Niagara Falls | 156 | 15,887 | 673 | ... |
| Ogdensburg | 329 | 326 | 2,800 | 600 |
| Olean | 2,350 | 3,061 | .... | ... |
| Oneida | 1,650 | .... | .... | ... |
| Oswego | 8,795 | 15,061 n | .... | ... |
| Poughkeepsie | 2,988 | 3,015 | 997 | ... |
| Saratoga Springs | 2,569 | .... | .... | ... |
| Solvay | 2,640 i | .... | .... | ... |
| Syracuse | 2,520 | 14,440 | 2,685 | ... |
| Troy | 1,218 | 5,681 | 8,108 | ... |
| Utica | 4,795 | 2,199 | 1,504 | ... |
| **North Carolina:** | | | | |
| Durham | 7,970 | 40 | .... | ... |
| Fayetteville | 1,000 | .... | .... | ... |
| Gastonia | 12,272 | 4,365 | .... | ... |
| Goldsboro | 2,500 | .... | .... | ... |
| Wilmington | 158,400 b | .... | .... | ... |
| **North Dakota:** | | | | |
| Bismarck | 3,680 | 505 | 1,693 | 117 |
| Fargo | .... | 93,126 | 17,059 | ... |
| Minot | .... | 9,240 | .... | ... |
| **Ohio:** | | | | |
| Akron | 17,880 | 3,251 | 1,287 | ... |
| Ashtabula | 3,088 | .... | .... | ... |
| Bellefontaine | 2,069 | 1,334 | 1,661 | ... |
| Bucyrus | .... | 14,789 | 5,589 | ... |
| Cambridge | 2,600 | .... | .... | ... |
| Canton | 46,217 | 11,267 | 37,590 | ... |
| Chillicothe | .... | 1,572 | .... | ... |
| Cincinnati | .... | 54,170 | 23,882 | 132 |
| Cleveland | 157,188 i | .... | .... | ... |
| Columbus | 38,428 | 39,171 | 23,729 | ... |
| Dayton | 21,026 | 15,694 | .... | ... |
| Delaware | 3,300 | .... | .... | ... |
| Fostoria | .... | 1,225 | .... | ... |
| Gallipolis | .... | 1,051 | 1,529 | ... |
| Greenville | 6,630 | 1,970 | .... | ... |
| Lakewood | 18,455 | 9,292 | 3,788 | 3,873 |
| Lorain | 10,209 | 1,616 | .... | ... |
| Marietta | 21,935 | 6,793 | 1,950 | ... |
| Marion | 20,001 | 14,163 | 7,331 | ... |
| Massillon | 5,000 | .... | .... | ... |
| Nelsonville | .... | 1,100 | .... | ... |
| Newark | 16,160 b | .... | .... | ... |
| Springfield | 29,412 | 18,400 | 5,300 | ... |
| Steubenville | .... | 3,304 | 1,412 | ... |
| Urbana | 53,071 | 11,876 | 3,144 | ... |
| Wellsville | 1,000 | .... | .... | ... |
| **Oklahoma:** | | | | |
| Bartlesville | 17,242 | 444 | 330 | ... |
| Durant | 84,480 e | .... | .... | ... |
| Oklahoma City | 3,000 | .... | .... | ... |
| Shawnee | 20,000 | .... | .... | ... |
| **Oregon:** | | | | |
| Portland | 93,243 | 40,566 | 11,183 | 670 |
| **Pennsylvania:** | | | | |
| Allentown | .... | .... | 442 | ... |
| Altoona | 6,524 | .... | 130 | ... |
| Beaver Falls | 63,000 b | .... | .... | ... |
| Bellevue | 328 | .... | .... | ... |
| Carbondale | 19,770 | 3,475 | 580 | 400 |
| Carlisle | 1,359 | 2,460 | .... | ... |
| Catasauqua | 34 | 30 | 160 | ... |
| Chambersburg | 1,497 | .... | .... | ... |
| Charleroi | 2,350 | 660 | .... | ... |
| Clearfield | 3,690 | 1,100 | .... | ... |
| Coatesville | .... | .... | 825 | ... |
| Connellsville | .... | 300 | .... | ... |
| Coraopolis | 1,850 | .... | .... | ... |
| Donora | 1,400 | .... | .... | ... |
| DuBois | 6,400 | .... | .... | ... |
| Dunmore | .... | 466 | .... | ... |
| Duquesne | 1,500 | 2,500 | 1,000 | ... |
| Erie | 12,846 | 21,934 | 8,417 | 389 |
| Freeland | 1,065 | 350 | .... | ... |
| Greensburg | 2,944 | 156 | 110 | ... |
| Greenville | 546 | .... | .... | ... |
| Harrisburg | 9,369 | 14,966 | 1,853 | 718 |
| Hazleton | .... | .... | 384 | ... |
| Hollidaysburg | .... | 1,000 | .... | ... |
| Jeannette | 1,680 | 886 | .... | 200 |
| Jersey Shore | 4,500 | .... | .... | ... |
| Juniata | .... | 447 | 340 | 700 |
| Kingston | 1,000 | 2,250 | .... | ... |

| City— | Less than 10-inch. | 10 to 15-inch. | 16 to 24-inch. | Larger than 24-inch. |
|---|---|---|---|---|
| **Pennsylvania (Continued):** | | | | |
| Lancaster | 6,986 g | .... | .... | ... |
| Lebanon | 21,000 l | .... | .... | ... |
| McKeesport | 5,768 | 6,294 | 842 | ... |
| Meadville | 7,090 | .... | .... | ... |
| Miners Mills | 770 | 310 | .... | ... |
| Norristown | 900 | .... | .... | ... |
| Peckville | 614 | .... | .... | ... |
| Philadelphia | 133,584 i | .... | .... | ... |
| Pittsburgh | .... | 7,386 | 3,200 | 2,157 |
| Rankin | .... | 400 | .... | ... |
| Reading | .... | 10,753 | 17,058 | 535 |
| Scottdale | 570 | 640 | .... | ... |
| Shenandoah | .... | 4,428 | 1,696 | 930 |
| South Bethlehem | 1,070 | 180 | 1,654 | ... |
| Titusville | 952 | .... | 200 | ... |
| Washington | 2,400 | .... | .... | ... |
| **Rhode Island:** | | | | |
| Bristol | 440 | .... | .... | ... |
| Providence | 16,563 i | .... | .... | ... |
| **South Carolina:** | | | | |
| Columbia | 21,063 | 8,320 | 7,839 | ... |
| Florence | 2,000 | 1,200 | 1,200 | ... |
| Orangeburg | 1,646 | 158 | 384 | ... |
| **South Dakota:** | | | | |
| Lead | 900 | 390 | .... | ... |
| Mitchell | 5,890 | 368 | .... | ... |
| Sioux Falls | 12,465 | 996 | .... | ... |
| **Tennessee:** | | | | |
| Johnson City | 16,592 | 50 | 533 | ... |
| **Texas:** | | | | |
| Abilene | 1,200 | .... | .... | ... |
| Austin | 40,024 | 6,244 | 900 | ... |
| Beaumont | 10,750 | 320 | .... | ... |
| El Paso | 18,480 k | 2,640 | .... | ... |
| Houston | 86,183 | 24,914 | 13,785 | 372 |
| Laredo | .... | .... | 4,700 | ... |
| San Antonio | 116,100 | 15,900 | 28,300 | ... |
| Waxahachie | 5,629 | .... | .... | ... |
| **Utah:** | | | | |
| Ogden | 978 | .... | .... | ... |
| Provo | 372 | 912 | .... | ... |
| Salt Lake City | 31,635 i | .... | .... | ... |
| **Vermont:** | | | | |
| Rutland | 6,412 | 3,239 | .... | ... |
| **Virginia:** | | | | |
| Danville | 9,000 | .... | .... | ... |
| Newport News | 2,500 | .... | 720 | ... |
| Petersburg | 20,000 | .... | 2,400 | ... |
| Richmond | 63,713 | 40,926 | 24,988 | ... |
| Staunton | 1,308 | .... | 380 | ... |
| Suffolk | 2,001 k | .... | .... | ... |
| Winchester | 2,000 | .... | .... | ... |
| **Washington:** | | | | |
| Aberdeen | 2,224 | 5,087 | 160 | ... |
| North Yakima | 1,567 | 5,615 | .... | ... |
| Tacoma | 20,069 | 5,142 | .... | ... |
| Vancouver | 17,180 | 6,990 | .... | ... |
| Walla Walla | 588 | .... | .... | ... |
| **West Viriginia:** | | | | |
| Bluefield | 13,400 | 13,000 | .... | ... |
| Elkins | .... | 6,298 | 2,442 | ... |
| Fairmont | 2,355 | 6,125 | .... | ... |
| **Wisconsin:** | | | | |
| Baraboo | 2,000 | 2,100 | .... | ... |
| Chippewa Falls | .... | 2,780 | 2,396 | ... |
| Eau Claire | 1,420 | 1,455 | 1,408 | 660 |
| Green Bay | .... | 5,601 | 4,313 | 180 |
| Janesville | 238 | .... | 566 | ... |
| La Crosse | .... | 1,850 | .... | ... |
| Marinette | .... | 2,774 | 370 | ... |
| Merrill | .... | 5,000 | 2,800 | ... |
| Neenah | .... | 1,170 | .... | ... |
| Oshkosh | .... | 4,562 | 73 | ... |
| Portage | 650 | .... | .... | ... |
| Superior | 4,309 | 23,111 | 16,928 | 1,293 |
| Watertown | 499 | 2,837 | 472 | ... |
| Waukesha | 367 | 565 | 1,168 | ... |
| West Allis | 6,934 | 4,076 | 250 | ... |
| **Wyoming:** | | | | |
| Cheyenne | 800 | .... | .... | ... |
| Sheridan | 7,500 | 4,160 | .... | ... |
| **Canada:** | | | | |
| Brandon, Man. | 65,502 | 48,232 | 1,688 | 2,350 |
| Edmonton, Alta. | 7,302 | 69,479 | 13,698 | 3,287 |
| Hamilton, Ont. | .... | 25,756 | 552 | ... |
| Kingston, Ont | 1,690 | 3,920 | .... | ... |
| Lethbridge, Alta. | 928 | 2,632 | .... | ... |
| London, Ont. | 16,619 | 34,069 | 6,265 | ... |
| Port Arthur, Ont. | 1,230 | 7,033 | 438 | ... |
| Stratford, Ont. | 34,700 | 1,200 | 2,890 | ... |
| Toronto, Ont. | 37,390 | 216,598 | 65,532 | ... |
| Vancouver, B. C. | 4,224 b | .... | .... | ... |

**Vitrified Segment Block;** lineal feet laid:

Conn.—Bridgeport, 5,691; Hartford, 3,284. Georgia—Atlanta, 7,130. Illinois—Decatur, 800. Kansas—Topeka, 3,790. Me.—Waterville, 297. Mass.—Fitchburg, 1,064. Mich.—Benton Harbor, 3,458; Flint, 17,653; Ludington, 10,560 (under construction). Minn.—Chisholm, 2,368; Owatonna, 3,131; St. Paul, 5,903. Virginia—9,908. New York—New Rochelle, 1,995; Ogdensburg, 3,250. Ohio—Akron, 4,940; Bucyrus, 5,123; Canton, 1,659; Columbus, 19,707; Marion, 1,753; Steubenville, 1,302. Texas—San Antonio, 850. W. Va.—Bluefield, 135; Elkins, 450. Wis.—Superior, 2,728.

a—15 and 18-inch; b—8-inch to 24-inch; c—6-inch to 12-inch; d—8-inch to 20-inch; e—6-inch to 15-inch; f—8 inch to 30-inch; g—8-inch to 15-inch; i—sizes not stated; j—8-inch to 12-inch; k—8 and 10-inch; l—6 to 18-inch; m—8 to 27-inch; n—10 to 36-inch.

## TABLE NO 2.—LINEAL FEET OF CONCRETE PIPE LAID IN 1914.

| City— | Less than 10-inch. | 10 to 15-inch. | 16 to 24-inch. | Larger than 24-inch. |
|---|---|---|---|---|
| **Arkansas:** | | | | |
| Fort Smith | 21,991 | 6,974 | .... | .... |
| **California:** | | | | |
| Alhambra | .... | .... | .... | 626 |
| Eureka | .... | .... | 1,000 | .... |
| San Diego | 1,322 | .... | .... | .... |
| **Colorado:** | | | | |
| Colorado Springs. | 2,200 | 350 | 670 | .... |
| **Connecticut:** | | | | |
| Bridgeport | .... | 3,271 | 2,020 | 5,733 |
| Hartford | .... | .... | .... | 4,974 |
| **Indiana:** | | | | |
| South Bend | ... | .... | .... | 2,506 |
| Washington | .... | 900 | 700 | .... |
| **Iowa:** | | | | |
| Burlington | 2,549a | .... | .... | .... |
| Council Bluffs | .... | .... | .... | 9,561 |
| **Kansas:** | | | | |
| Independence | 3,120 | 330 | .... | .... |
| **Michigan:** | | | | |
| Flint | .... | 940 | 718 | .... |
| Saginaw | 694 | 18,202 | 2,989 | .... |
| **Missouri:** | | | | |
| Kansas City | 59,928b | .... | .... | .... |
| **Nebraska:** | | | | |
| Fremont | .... | .... | 7,948 | .... |
| **New Jersey:** | | | | |
| Newark | .... | .... | .... | 5,833 |
| **New York:** | | | | |
| Albany | .... | .... | .... | 7,522 |
| Niagara Falls | .... | .... | .... | 1,696 |
| Oswego | .... | .... | .... | 1,236 |
| **Ohio:** | | | | |
| Cincinnati | .... | .... | .... | 3,279c |
| Columbus | .... | .... | .... | 832 |
| **Oklahoma:** | | | | |
| Tulsa | 25,000 | 3,000 | .... | .... |
| **Oregon:** | | | | |
| Portland | 18,392 | 8,903 | 663e | 7,385c |
| **Pennsylvania:** | | | | |
| Altoona | .... | .... | .... | 14,344c |
| **South Carolina:** | | | | |
| Orangeburg | .... | .... | .... | 451 |
| **Tennessee:** | | | | |
| Jackson | 900 | .... | .... | .... |
| **Texas:** | | | | |
| El Paso | .... | .... | .... | 14,520 |
| Houston | .... | .... | .... | 2,524 |
| **Utah:** | | | | |
| Salt Lake City | 35,939f | .... | .... | .... |
| **Washington:** | | | | |
| Tacoma | 9,001 | 6,548 | 1,732 | 1,043 |
| **Wisconsin:** | | | | |
| Oshkosh | .... | .... | .... | 1,053 |
| Superior | .... | .... | .... | 148 |
| **Canada:** | | | | |
| Hamilton, Ont. | .... | .... | .... | 1,081 |
| Vancouver, B. C. | 47,520d | .... | .... | .... |

a—8 to 18-inch; b—8 to 66-inch; c—Reinforced; d—8 to 30-inch; e—16 to 20-inch; f—sizes not stated.

## TABLE NO 3—CONCRETE SEWER BUILT IN PLACE IN 1914.

| City. | Less than 31-inch. | 37 to 48-inch. | 49 to 72-inch. | Larger than 72-inch. |
|---|---|---|---|---|
| **California:** | | | | |
| Berkeley | .... | 5,949* | 25,926* | 10,686* |
| Oakland | 5,415a | 374* | 3,984 | 241a |
| **Connecticut:** | | | | |
| Hartford | 10,114 | .... | 1,104 | .... |
| New Haven | 3,135* | .... | .... | .... |
| **Delaware:** | | | | |
| Wilmington | 1,200 | 800 | .... | .... |
| **Dist. of Columbia:** | 14,130*b | .... | .... | .... |
| **Georgia:** | | | | |
| Atlanta | .... | .... | .... | 1,589* |
| **Illinois:** | | | | |
| Cairo | .... | .... | 500* | .... |
| Chicago Heights | 5,296 | 653 | 4,848 | 1,933 |
| Mattoon | .... | 612 | .... | .... |
| **Indiana:** | | | | |
| Marion | 4,042* | .... | .... | .... |
| **Iowa:** | | | | |
| Burlington | .... | 2,872* | .... | 3,437* |
| Keokuk | .... | .... | 165 | .... |
| **Kansas:** | | | | |
| Independence | .... | 2,700* | 1,600* | .... |
| Pittsburg | 580* | .... | .... | .... |
| Salina | 603* | .... | .... | .... |
| **Kentucky:** | | | | |
| Owensboro | .... | 100* | .... | .... |
| **Massachusetts:** | | | | |
| Boston | 7,483 | 3,064 | 2,089 | 3,231 |
| Cambridge | 2,032c | .... | .... | .... |
| Fitchburg | 7,803 | .... | 1,741* | .... |
| Springfield | 3,609 | .... | .... | .... |
| Waltham | 546 | .... | .... | .... |
| Worcester | 175* | .... | 1,931a | .... |
| **Michigan:** | | | | |
| Battle Creek | .... | 200 | .... | .... |
| Grand Rapids | 2,546* | .... | .... | .... |
| Kalamazoo | .... | 1,836 | 1,733 | .... |
| **Minnesota:** | | | | |
| Faribault | 147* | .... | .... | .... |
| Mankato | 55* | 1,090* | 396* | .... |
| Minneapolis | 3,019* | 7,929* | 8,965* | 522* |
| Owatonna | .... | .... | 586* | .... |
| St. Paul | .... | 283* | 4,019* | 280* |
| **Missouri:** | | | | |
| Hannibal | .... | .... | 2,900 | .... |
| Kansas City | 5,386*d | .... | .... | .... |
| **Nebraska:** | | | | |
| Columbus | .... | .... | 3,700* | .... |
| Omaha | .... | 63 | .... | .... |
| **New Hampshire:** | | | | |
| Dover | 707 | .... | .... | .... |
| **New Jersey:** | | | | |
| Atlantic City | 16* | 1,172* | .... | .... |
| Plainfield | 463* | .... | .... | .... |
| **New York:** | | | | |
| Albany | .... | .... | 4,106 | 2,002 |
| Corning | 435* | .... | .... | .... |
| New Rochelle | .... | .... | 1,850* | .... |
| Niagara Falls | .... | .... | 43* | .... |
| Oswego | .... | .... | .... | 2,148* |
| Syracuse | .... | 765* | .... | .... |
| Troy | .... | .... | .... | 3,956* |
| **Ohio:** | | | | |
| Cleveland | 2,486c | .... | .... | .... |
| Chillicothe | .... | .... | 200* | 275* |
| Cincinnati | .... | .... | 67* | 2,624* |
| Columbus | .... | .... | 2,118 | 1,307 |
| Dayton | 8,953 | 3,538 | 431 | .... |
| Springfield | .... | .... | 7,201* | .... |
| **Oklahoma:** | | | | |
| Tulsa | .... | 2,500 | .... | 300 |
| **Oregon:** | | | | |
| Portland | 1,895 | 906 | .... | .... |
| **Pennsylvania:** | | | | |
| Allentown | 243* | 81* | .... | 823* |
| Harrisburg | 4,956* | .... | .... | .... |
| Pittsburgh | .... | .... | .... | 60 |
| Reading | 1,253 | 2,956 | .... | .... |
| **South Carolina:** | | | | |
| Columbia | 1,556* | .... | .... | .... |
| Florence | .... | .... | 1,700 | .... |
| Orangeburg | .... | .... | .... | 220* |
| **Texas:** | | | | |
| Beaumont | 3,061* | .... | .... | .... |
| Houston | 7,717 | 746 | 3,213 | .... |
| San Antonio | 7,610 | 15,700 | 6,000* | .... |
| **Vermont:** | | | | |
| Rutland | .... | 175* | .... | .... |
| **Virginia:** | | | | |
| Pittsburg | 3,500 | .... | .... | .... |
| Richmond | 906* | .... | .... | 150* |
| **West Virginia:** | | | | |
| Bluefield | .... | 600 | 200* | .... |
| **Wisconsin:** | | | | |
| Janesville | 1,727 | .... | .... | .... |
| Oshkosh | .... | .... | .... | 575* |
| Waukesha | 1,625* | 184* | .... | .... |
| **Canada:** | | | | |
| Brandon, Man. | 1,230 | 21,997 | .... | .... |
| Edmonton, Alta. | .... | 13,131* | 16,508* | 2,486* |
| Hamilton, Ont. | .... | .... | 330* | .... |
| Stratford, Ont. | .... | .... | .... | 1,978* |
| Toronto, Ont. | 22,986*c | .... | .... | .... |
| Vancouver, B. C. | 2,112ae | .... | .... | .... |

*—Reinforced; a—reinforcement used in part; b—30 to 96-inch; c—size not stated; d—36 to 72-inch; e—30 to 48-inch.

## TABLE NO. 4. SEWERS OF MISCELLANEOUS MATERIAL BUILT IN 1914.

| City. | Material. | Length feet. | Size inches. |
|---|---|---|---|
| **California:** | | | |
| Los Angeles | Conc. invert & brick arch | 5,280 | 30 |
| **Connecticut:** | | | |
| Bridgeport | Cast iron | 2,068 | 8-42 |
| New Haven | Brick | 1,139 | 24 |
| | | 1,321 | 30 |
| | | 171 | 36 |
| **Delaware:** | | | |
| Wilmington | Brick | 300 | 18x27 |
| | | 600 | 24x36 |
| **Georgia:** | | | |
| Atlanta | Brick | 440 | 28x42 |
| | | 355 | 32x48 |
| | | 465 | 42x63 |
| Brunswick | Cast iron | 1,000 | 14 |
| **Illinois:** | | | |
| Alton | Cast iron | 1,511 | 12 |
| | | 1,479 | 16 |
| Chicago | Brick | 60,680 | 30=90″ |
| Lyons | Brick, 2-ring | 350 | 27 |
| | Brick, 2-ring | 350 | 36 |
| **Indiana:** | | | |
| Portland | Cast iron | 84 | 30 |
| South Bend | Brick | 884 | 60 |
| | | 3,350 | 66 |
| | | 4,433 | 72 |
| Terre Haute | 2-ring vit. brick | 1,650 | 30 |
| Washington | Brick | 180 | 30 |
| | | 250 | 36 |
| | | 270 | 39 |
| | | 420 | 48 |

## TABLE NO. 4—SEWERS OF MISCELLANEOUS MATERIAL BUILT IN 1914.—Continued.

| City. | Material. | Length feet. | Size inches. |
|---|---|---|---|
| **Iowa:** | | | |
| Keokuk | Brick | 235 | .. |
| **Kansas:** | | | |
| Salina | Cast iron | 90 | 36 |
| **Massachusetts:** | | | |
| Boston | Brick | 24 | 15x20 |
| | | 39 | 24 |
| | Wooden box | 47 | 24 |
| Franklin | Cast iron | 1,500 | 6 |
| | | 2,600 | 8 |
| | | 900 | 12 |
| | | 1,150 | 14 |
| | | 4,200 | 16 |
| | | 2,500 | 18 |
| | | 984 | 20 |
| | | 5,220 | 24 |
| **Minnesota:** | | | |
| Minneapolis | Brick | 24 | 24 |
| | | 24 | 30 |
| | | 38 | 42 |
| | | 42 | 66 |
| St. Paul | Corrugated iron | 540 | 30 & 48 |
| **Missouri:** | | | |
| Kansas City | Brick | 880 | 48 to 78 |
| **Nebraska:** | | | |
| Omaha | Galv. iron & Conc. | 64 | 24 |
| | Cast iron | 110 | 6 & 8 |
| **New Jersey:** | | | |
| Atlantic City | Concrete invert and brick arch | 428 | 27 |
| | | 1,340 | 30 |
| | | 364 | 33 |
| | | 1,437 | 36 |
| Camden | Brick | 22,757 | .... |
| Jersey City | Iron pipe | 356 | 30 |
| | | 440 | 36 |
| | | 385 | 42 |
| | Brick | 277 | 24 |
| | | 290 | 42 |
| | | 129 | 54 |
| Plainfield | Cast iron pipe | 660 | 4 |
| | | 942 | 16 |
| **New York:** | | | |
| Binghamton | Cast iron pipe | 712 | 24 |
| **Ohio:** | | | |
| Akron | Concrete and brick | 3,322 | 60 |
| | Brick | 1,925 | 36 |
| | Iron pipe | 427 | 24 |
| Canton | 3-ring brick | 396 | 84 |
| | 2-ring brick | 1,782 | 84 |
| | Cast iron pipe | 328 | 12 |
| Cincinnati | Brick | 14,561 | 30-48 |
| | Brick | 6,742 | 48-96 |
| Cleveland | Brick | 58,163 | .... |
| Lakewood | Brick | 622 | 42 |
| | Brick | 3,887 | 66-75 |
| Lorain | Brick | 1,358 | 20x30 |
| | | 1,890 | 25x38 |
| **Pennsylvania:** | | | |
| Beaver Falls | Cast iron | 400 | 4 |
| | | 100 | 10 |
| Harrisburg | Cast iron | 270 | 8-36 |
| Meadville | Cast iron | 1,128 | 8 |
| Pittsburgh | Brick | 2,041 | 36 |
| | | 1,609 | 42 |
| | | 1,524 | 54 |
| **South Carolina:** | | | |
| Columbia | Cast iron | 400 | 16 |
| **Texas:** | | | |
| Houston | Matson blocks | 245 | 36 |
| | | 71 | 33 |
| **Virginia:** | | | |
| Richmond | Brick | 398 | 30 |
| | | 1,644 | 36 |
| | | 390 | 42 |
| | | 1,070 | 48 |
| | | 651 | 54 |
| | | 1,195 | 63 |
| | | 355 | 66 |
| **Wisconsin:** | | | |
| Chippewa Falls | Cast iron | 150 | 24 |
| Green Bay | Brick | 615 | 60 |
| **Canada:** | | | |
| Toronto, Ont. | Cast iron | 2,377 | 14 & 16 |
| | Brick | 69,250 | various. |
| | Brick and concrete | 21,882 | various. |

## TABLE NO. 5—STORM WATER INLETS.

| City. | Are inlets at centers of cor. curve? | Is there a catch basin at inlet? | Is the inlet trapped | Average frequency of cleaning, once in | Average amount of dirt removed Per cleaning. | Per year. |
|---|---|---|---|---|---|---|
| **Alabama:** | | | | | | |
| Dothan | About half. a | No | No | 60 days | Wheelbarrow | ..... |
| Gadsden | Yes | Yes | No | When dirty | ..... | ..... |
| Montgomery | Part b | No | No | Rarely | ..... | ..... |
| **California:** | | | | | | |
| Alhambra | Usually | Yes | No | A year | 3 or 4 cu. ft. | ..... |
| Berkeley | No c | No | Yes | ..... | ..... | ..... |
| Eureka | Yes | Yes | Yes | ..... | ..... | ..... |
| Marysville | Yes | Yes | Some | 4 months | 3 cu. ft. | ..... |
| Oakland | Yes | Comb. swrs. | Comb. swrs. | Irregular | ..... | ..... |
| **Colorado:** | | | | | | |
| Colorado Springs | Yes | Yes | No | 1 month | 9 cu. ft. | 4 cu. yds. |
| Denver | Yes b | Yes | No | After heavy storms | 1 cu. yd. | ..... |
| Fort Collins | Yes | Yes | Yes | 3 months | ¼ cu. yd. | ..... |
| **Connecticut:** | | | | | | |
| Ansonia | Yes d | Yes | No | 3 months | Cart load | ..... |
| Bridgeport | e | Yes | Yes | 1 month | 1 cu. yd. | 12 cu. yds. |
| Danbury | Yes b | Yes | Yes | 1 to 4 months | 1½ cu. yds. | ..... |
| Derby | Yes | Yes | Yes | ..... | ..... | ..... |
| Hartford | g | Yes | Yes | 3 months | ½ cu. yd. | 2 cu. yds. |
| Meriden | f | Yes | No | When necessary | 1 cu. yd. | ..... |
| Middletown | g | Yes | No | 4 to 6 months | 4 cu. yds. | ..... |
| New Haven | Yes d | Yes | Yes | 281 days | 1.3 cu. yds. | ..... |
| Rockville | Yes | Yes | No | 6 months | 1 cu. yd. | ..... |
| Torrington | f | Yes | No | 4 months | ..... | ..... |
| Wallingford | Yes | Yes | Yes | 4 months | 1.5 cu. yds. | ..... |
| Waterbury | e | No | No | ..... | ..... | ..... |
| **Delaware:** | | | | | | |
| Wilmington | c | No | No | ..... | ..... | ..... |
| **Dist. of Columbia:** | Yes | Yes | Yes | 1 month | 2.5 cu. ft. | 30 cu. ft. |
| **Florida:** | | | | | | |
| Gainesville | Yes b | Some cases | Few | 1 month | 1 cu. yd. | 12 cu. yds. |
| Pensacola | Yes h | Yes | No | 10 to 14 days | 2 or 3 cu. ft. | ..... |
| **Georgia:** | | | | | | |
| Americus | c | Yes | No | 3 months | ..... | ..... |
| Brunswick | i | Yes | Some | After each rain | 2 to 4 cu. ft. | ..... |
| Dublin | Yes | Yes | No | A week | ..... | ..... |
| **Idaho:** | | | | | | |
| Lewiston | Yes | Yes | No | 3 months | 10 inches | ..... |
| **Illinois:** | | | | | | |
| Alton | Yes | Yes | Some | A year | ¼ cu. yd. | ..... |
| Cairo | Yes h | Yes | Yes | 2 weeks | ..... | 150 to 200 cu. yds. |
| Charleston | .... | Yes | Yes | 3 months | ..... | ..... |
| Chicago | Formerly j | Yes | Yes | 1 month to 2 years | 2 cu. yds. | 1½ cu. yds. |
| Chicago Heights | Yes | Yes | Yes | 6 months | 2 cu. ft. | 4 cu. ft. |
| Collinsville | Yes | Yes | Yes | 6 months | ⅛ cu. yd. | ¼ cu. yd. |
| Decatur | Yes | Yes | Yes | A year | ½ cu. yd. | ..... |
| DeKalb | Yes | Yes | No | ..... | ..... | ..... |
| Dixon | c | Yes | Yes | ..... | ..... | ..... |
| East St. Louis | Yes | Yes | Yes | ..... | ..... | ..... |
| Evanston | Yes | Yes | Yes | A year | ½ cu. yd. | ½ cu. yd. |
| Fairbury | Yes | Yes | Yes | 30 days | ..... | ..... |
| Freeport | c | Yes | No | 4 months | ..... | ..... |
| Galesburg | Yes | Yes | Yes | 2 weeks | ..... | ..... |
| Herrin | Yes | No | No | ..... | ..... | ..... |
| Kewanee | e | k | .... | ..... | ..... | ..... |
| La Grange | Yes | Yes | Yes | 2 years | 1 cu. yd. | ½ cu. yd. |
| Litchfield | Yes | No | Yes | ..... | ..... | ..... |
| Marion | Yes | Yes | No | ..... | ..... | ..... |

For footnotes, see page 356.

## TABLE NO. 5—STORM WATER INLETS (Continued).

| City. | Are inlets at centers of cor. curve? | Is there a catch basin at outlet?† | Is the outlet trapped? | Average frequency of cleaning, once in | Average amount of dirt removed Per cleaning. | Per year. |
|---|---|---|---|---|---|---|
| **Illinois (Continued):** | | | | | | |
| Mattoon | Yes | No | Yes | ..... | ..... | ..... |
| Moline | Yes | No | No | ..... | ..... | ..... |
| Oak Park | Yes h | Yes | Yes | 9 months | ½ cu. yd. | ¾ cu. yd. |
| Pana | Yes & g | Old ones | No | 1 year | ..... | ..... |
| Peoria | Yes | .... | .... | ..... | ..... | ..... |
| Taylorville | g | Yes | Yes | After heavy rains | 1/5 cu. yd. | ½ to 4 cu. yds. |
| Waukegan | Yes | Yes | Yes | 6 months | 1½ cu. yds. | 3 cu. yds. |
| **Indiana:** | | | | | | |
| Anderson | e | No | No | ..... | ..... | ..... |
| Connersville | c | Yes | Yes | 1 month | ½ cu. yd. | 6 loads. |
| Crawfordsville | Yes | Yes | Yes | 6 months | 10 cu. ft. | ..... |
| Elkhart | e | Yes | Yes | ..... | ..... | ..... |
| Goshen | Yes l | Yes | Some | After rains | ..... | ..... |
| Jeffersonville | Yes | No | Yes | ..... | ..... | ..... |
| La Porte | Yes | Yes | Yes | 6 months | ½ to 1 bu. | ..... |
| Marion | Yes & e | Most | No | ..... | ..... | ..... |
| Muncie | c | Yes | Yes | 6 months | 1½ cu. yds. | 3 cu. yds. |
| Peru | Yes | Yes | Yes | 6 months | 1 cu. yd. | 1 cu. yd. |
| Portland | Yes & e | No | Yes | ..... | ..... | ..... |
| Terre Haute | Yes & f | Yes | Yes | 3 months | 1 to 1½ cu. yds | ..... |
| Washington | Yes | Yes | No | ..... | ..... | ..... |
| **Iowa:** | | | | | | |
| Boone | Yes | Yes | No | 1 to 3 months | ¼ to ½ cu. yd. | 1 to 4 cu. yds. |
| Burlington | m | Yes | No | A week | Little | ..... |
| Cedar Falls | Yes & e | Yes | No | 3 months | ..... | ..... |
| Cedar Rapids | Yes b | No | No | ..... | ..... | ..... |
| Council Bluffs | Yes | No | No | ..... | ..... | ..... |
| Davenport | f | Yes | No | After each rain | ..... | ..... |
| Des Moines | c | Yes | Yes | Flushed into sewer | ..... | ..... |
| Grinnell | Yes | Yes | No | 6 months | 1/6 cu. yd. | 1/3 cu. yd. |
| Keokuk | Yes | Yes | Yes | A week | 1½ cu. ft. | ..... |
| Muscatine | e | No | No | ..... | ..... | ..... |
| Oskaloosa | Yes | Yes | No | A year | ..... | 1/3 cu. yd. |
| **Kansas:** | | | | | | |
| Arkansas City | Yes | Yes | No | 6 months | ..... | ..... |
| Chanute | Yes | Yes | No | 3 months | ..... | ..... |
| Coffeyville | Yes | Yes | Some | ..... | ..... | ..... |
| Independence | Yes | .... | .... | ..... | ..... | ..... |
| Hutchinson | Yes j | Yes | No | After each rain | 1 bushel | ..... |
| Iola | Yes | Yes | No | 6 months | ..... | ..... |
| Manhattan | Yes b | Yes | No | After each rain | ..... | ..... |
| Ottawa | Yes | Yes | No | 6 months | Little | ..... |
| Pittsburg | Yes | Yes | No | A year | 1 cu. ft. n | ..... |
| Rosedale | Yes b | Most | No | ..... | ..... | ..... |
| Salina | e | Yes | Yes | 4 months | ..... | ..... |
| Topeka | Yes | No | No | ..... | ..... | ..... |
| Wellington | Yes | Yes | No | A month | ¼ cu. yd. | 2 cu. yds. |
| Wichita | Yes | Yes | No | 2 weeks o | 2 cu. ft. p | 6 cu. yds. |
| **Kentucky:** | | | | | | |
| Owensboro | Yes | Yes | Yes | 4 months | 1 cu. ft. | 3 cu. ft. |
| **Maine:** | | | | | | |
| Augusta | f | Yes | Yes | 6 months | ½ cu. yd. | 1 cu. yd. |
| Waterville | Various | Yes | Yes | ..... | ..... | ..... |
| **Maryland:** | | | | | | |
| Frederick | c | Yes | Yes | A week | ..... | ..... |
| **Massachusetts:** | | | | | | |
| Adams | .... | Yes | No | 3 months | ..... | ..... |
| Boston | Yes & s | Yes | Yes | 6 months | ..... | 3.34 cu. yds. |
| Brookline | .... | Yes | Yes | 3 months | 2½ cu. yds. | 10 cu. yds. |
| Cambridge | e | Yes | Yes | 8 months | 2 cu. yds. | 3 cu. yds. |
| Clinton | c | Yes | Yes | 4 months | ..... | ..... |
| Fairhaven | .... | Most | Few | 6 weeks | ..... | ..... |
| Fitchburg | Yes & f | Yes | Yes | 4 months | 2 cu. yds. | 6 cu. yds. |
| Greenfield | c | Yes | Some | 3 months | ½ cu. yd. | 2 cu. yds. |
| Haverhill | e | Yes | Some | 3 months | ..... | ..... |
| Lawrence | e | Yes | Yes | 8 months | ..... | ..... |
| Lynn | g | Yes | Yes | A year | 1½ to 3 loads | ..... |
| Malden | .... | Yes | Few | ..... | ..... | ..... |
| Newton | g | Yes | No | 3½ months | ¼ to 1/3 cu. yd. | 1.9 cu. yds. |
| North Adams | Yes | Yes | No | 6 months | ..... | ..... |
| North Attleboro | r | Yes | No | 3½ months | 18 cu. ft. | 2½ cu. yds. |
| Quincy | s | Yes | Most | A month | ..... | ..... |
| Revere | .... | Yes | Yes | 6 months | 1¼ cu. yds. | 2½ cu. yds. |
| Springfield | j | No | No | ..... | ..... | ..... |
| Stoneham | Yes | Yes | Yes | 6 months | ¼ cu. yd. | ½ cu. yd. |
| Taunton | .... | Yes | Yes | 6 months | ..... | 1½ cu. yds. |
| Waltham | g | Yes | Yes | ..... | ..... | ..... |
| Westfield | .... | Yes | No | 6 months | ¼ cu. yd. | ½ cu. yd. |
| Worcester | g | Yes | Yes | Frequently | ..... | 2.36 cu. yds. |
| **Michigan:** | | | | | | |
| Ann Arbor | e | Some | No | ..... | ..... | ..... |
| Battle Creek | c | Few | Few | 2 months | ½ to ¾ cu. yd. | 3 cu. yds. |
| Benton Harbor | .... | No | No | ..... | ..... | ..... |
| Coldwater | Yes | Yes | Yes | 4 months | ..... | ..... |
| Escanaba | Yes | Yes | No | A month | 1 cu. yd. | 12 cu. yds. |
| Flint | Yes & e | Yes | No | ..... | ..... | ..... |
| Grand Rapids | c | Yes | No | 4 months | 32 cu. ft. | 3½ cu. yds. |
| Kalamazoo | Yes & e | No | No | ..... | ..... | ..... |
| Ludington | .... | Yes | Yes | 6 months | 2 bushels | ..... |
| Manistee | Yes | Yes | Yes | A month | 1½ cu. yds. | 18 cu. yds. |
| Monroe | Yes | Yes | Yes | 4 months | 3 cu. ft. | 9 cu. ft. |
| Negaunee | c | Yes | Yes | A month | 2 to 5 pails | ..... |
| Pontiac | Yes | Yes | Yes | 2 weeks | ½ cu. yd. | ..... |
| Saginaw | Yes | Yes | Yes | 6 months | ½ cu. yd. | 1 cu. yd. |
| **Minnesota:** | | | | | | |
| Albert Lea | f | Some | No | After each storm | ..... | ..... |
| Austin | f | Yes | Few | After heavy rains | 10 cu. ft. | ..... |
| Chisholm | Yes | Yes | Yes | 3 months | ..... | ..... |
| Faribault | f | Yes | No | When full | 1¾ cu. yds. | ..... |
| Mankato | Yes | Yes | No | After heavy rains | 1 cu. yd. | 6 cu. yds. |
| Minneapolis | f | Few | No | After heavy rains | ..... | ..... |
| New Ulm | f | Yes | Yes | 3 months | ..... | ..... |
| Owatonna | f | Yes | Few | 4 months | ½ cu. yd. | 1½ cu. yds. |
| Red Wing | Yes b | Yes | Yes | A year | ..... | ..... |
| Rochester | g | .... | .... | ..... | ..... | ..... |
| St. Cloud | Old b | Yes | Yes | 6 months | ..... | ..... |
| St. Paul | m | Yes | Yes | ..... | ..... | ..... |
| Stillwater | Yes | Yes | Yes | 3 weeks | 1 cu. yd. | 18 cu. yds. |
| Virginia | Yes b | No | No | ..... | ..... | ..... |

For footnotes, see page 356.

## TABLE NO. 5—STORM WATER INLETS (Continued).

| City. | Are inlets at centers of cor. curve? | Is there a catch basin at inlet? | Is the outlet trapped? | Average frequency of cleaning, once in | Average amount of dirt removed Per cleaning. | Per year. |
|---|---|---|---|---|---|---|
| **Mississippi:** | | | | | | |
| Hattiesburg | c | Yes | No | Several months | ..... | ..... |
| Jackson | c | Few | .... | ..... | ..... | ..... |
| Meridian | e | Yes | No | 2 months | ..... | ..... |
| Vicksburg | c | Yes | No | ..... | ..... | ..... |
| **Missouri:** | | | | | | |
| Kansas City | g | No | No | ..... | ..... | ..... |
| Kirksville | .... | Yes | No | 6 months | 2 cu. ft. | 4 cu. ft. |
| Moberly | Yes | .... | Part | ..... | ..... | ..... |
| Poplar Bluff | Yes | Yes | No | A week t | 1 cu. yd. | 52 cu. yds. t |
| St. Charles | .... | .... | .... | ..... | ..... | ..... |
| Sedalia | Yes | Yes | Yes | 5 months | 1 wagon load | ..... |
| **Montana:** | | | | | | |
| Billings | Yes | k | Yes | 10 days t | ¾ cu. yd. | 27 cu. yds. t |
| Bozeman | Yes & e | Yes | No | 2 months | 1 cu. yd. | ..... |
| Great Falls | Yes & e | k | No | A week | ..... | ..... |
| Helena | Yes | No | No | ..... | ..... | ..... |
| Kalispell | Yes | Yes | New | A year | ..... | ..... |
| **Nebraska:** | | | | | | |
| Columbus | Yes | Yes | No | ..... | ..... | ..... |
| Grand Island | Yes | Yes | .... | A year | 1 cu. yd. | ..... |
| Lincoln | Yes | No | Few | ..... | ..... | ..... |
| Norfolk | j | No | No | ..... | ..... | ..... |
| Omaha | f | No | No | ..... | ..... | ..... |
| **New Hampshire:** | | | | | | |
| Berlin | e | Yes | Some | Im'ed'tely aft. storms | ..... | ..... |
| Concord | f | Yes | Some | 6 months | ..... | ..... |
| Dover | .... | Yes | Yes | 6 months | ..... | ..... |
| Keene | f | Yes | Some | After rains | ⅛ to ½ cu. yd. | ..... |
| Laconia | .... | Yes | No | 2 weeks | ..... | ..... |
| **New Jersey:** | | | | | | |
| Asbury Park | Yes | Yes | No | ..... | ..... | ..... |
| Atlantic City | f | k | Yes | ..... | ..... | ..... |
| Camden | Yes & e | Yes | Yes | 3 or 4 months | ½ cu. yd. | 1½ cu. yds. |
| Jersey City | Yes | Yes | Yes | A month | 1½ cu. yds. | 18 cu yds. |
| Millville | e | Yes | No | A month | ..... | ..... |
| Montclair | .... | New | No | 2 to 12 months | ..... | ..... |
| Morristown | .... | Yes | Yes | 4 months | 1 cu. yd. | 3 cu. yds. |
| Newark | Yes | Yes | Yes | 8 months | 2.1 cu. yds. | ..... |
| Plainfield | f | Some | No | 2 months | ..... | ..... |
| Ridgewood | e | Yes | No | 2 weeks | ..... | ..... |
| Rutherford | Yes & e | Yes | No | After 2 or 3 storms | ..... | Less than 1 cu. yd. |
| Union | Yes | Yes | Yes | 6 months | ½ cu. yd. | 0.8 cu. yd. |
| **New Mexico:** | | | | | | |
| Albuquerque | f | Yes | No | 6 months | ½ cu. yd. | 1 cu. yd. |
| **New York:** | | | | | | |
| Binghamton | e | Yes | Yes | 4 months | 1½ cu. yds. | 4½ cu. yds. |
| Corning | Yes | Yes | No | A month | ..... | ..... |
| Dunkirk | Yes | Yes | Yes | ..... | ..... | ..... |
| Elmira | u | Yes | Yes | 4 months | 4 cu. ft. | ..... |
| Hoosic Falls | Yes | Yes | Yes | After storms | ..... | 25 cu. yds. |
| Hudson | Yes | Yes | No | A month | ¼ cu. yd. | 3 cu. yds. |
| Jamestown | .... | Yes | No | 2 weeks | ..... | ..... |
| Kingston | Generally | Yes | Yes | 6 months | ..... | ..... |
| Little Falls | e | Yes | No | A month | ½ cu. yd. | 6 cu. yds. |
| Niagara Falls | c | Yes | No | ..... | ¼ cu. yd. | ..... |
| Ogdensburg | Yes | Yes | Yes | A week t | 1 cu. ft. | 30 cu. ft. |
| Olean | e | Yes | Yes | 4 to 6 months | 6 cu. ft. | 18 cu. ft. |
| Oneida | e | Yes | Yes | A year | ½ cu. yd. | ½ cu. yd. |
| Oswego | e | Yes | Yes | After heavy rains | 4 cu. ft. | ..... |
| Poughkeepsie | Yes | Yes | Yes | 16 days | 1 cu. yd. | ..... |
| Saratoga Springs | Yes | Yes | Yes | 3 or 4 months | ½ cu. yd. | 2 cu. yds. |
| Solvay | Yes | Yes | Yes | 6 months | 2 cu. yds. | 4 cu. yds. |
| Hoosick Falls | Yes | Yes | No | After storms | ..... | 25 cu. yds. |
| Olean | e | Yes | Yes | 4 to 6 months | 6 cu. ft. | 18 cu. ft. |
| Oneida | e | Yes | Yes | 12 months | ½ cu. yd. | ½ cu. yd. |
| Syracuse | f | Most | Most | 6 months | 1½ cu. yds. | 3 cu. yds. |
| Utica | d | Yes | Yes | 4 months | ½ cu. yd. | 1½ cu. yds. |
| **North Carolina:** | | | | | | |
| Goldsboro | c | No | No | ..... | ..... | ..... |
| **North Dakota:** | | | | | | |
| Bismarck | Yes | Yes | No | ..... | ..... | ..... |
| Fargo | Yes | Yes | Yes | 6 months | 12 cu. ft. | 24 cu. ft. |
| Minot | c | No | No | ..... | ..... | ..... |
| **Ohio:** | | | | | | |
| Akron | .... | Yes | Yes | ..... | 1½ cu. yd. | ..... |
| Ashtabula | e | Yes | v | 3 months | ½ cu. yd. | ..... |
| Bellefontaine | Yes & g | No | No | ..... | ..... | ..... |
| Bucyrus | Yes | Yes | Yes | Never | ..... | ..... |
| Cambridge | .... | Some | No | 4 to 6 months | 3 bushels | ..... |
| Canton | c | Yes | No | ..... | ..... | ..... |
| Chillicothe | l | Yes | Some | 4 to 6 months | ½ cu. yd. | 1½ cu. yds. |
| Cleveland | u | Yes | Yes | A year | ½ cu. yd. | ½ cu. yd. |
| Columbus | Yes | Yes | Yes | A month | ½ cu. yd. | 6 cu. yds. |
| Dayton | c | Yes | Yes | 6 months | 2 cu. yds. | 4 cu. yds. |
| Delaware | Yes | Some | No | 12 months | ..... | ..... |
| Fostoria | w | Yes | Yes | 6 months | 3 cu. yds. | 6 cu. yds. |
| Gallipolis | c | .... | .... | ..... | ..... | ..... |
| Greenville | e | Yes | Yes | 6 months | ½ cu. yd. | 1 cu. yd. |
| Lakewood | s | Yes | Yes | 3 months | ½ cu. yd. | 2 cu. yds. |
| Loraine | Yes | v | No | ..... | ..... | ..... |
| Marietta | g | Yes | No | 3 months | Capacity | ..... |
| Marion | f | Yes | Yes | 6 months | ..... | ..... |
| Massillon | c | Yes | No | 6 months | 1 cu. yd. | 2 cu. yds. |
| Nelsonville | Yes | Yes | Some | 12 months | ..... | ..... |
| Newark | e | Yes | Yes | 3 months | ½ cu. yd. | 2 cu. yds. |
| St. Marys | c | No | No | ..... | ..... | ..... |
| Springfield | c | Yes | Yes | 2 weeks | 3 cu. ft. | 3 cu. yds. |
| Steubenville | e | Yes | Yes | 6 months | 0.8 cu. yd. | 1½ cu. yds. |
| Urbana | c | k | No | 6 to 10 months | ..... | ..... |
| Washington C H | Yes | Yes | Yes | 4 months | ½ cu. yd. | 1¾ cu. yds. |
| **Oklahoma:** | | | | | | |
| Bartlesville | Yes | No | No | ..... | ..... | ..... |
| Lawton | Yes | No | No | ..... | ..... | ..... |
| Oklahoma City | Yes | No | No | ..... | ..... | ..... |
| Shawnee | Yes | Yes | Some | 3 months | 6 cu. ft. | 24 cu. ft. |
| Tulsa | Yes | .... | .... | ..... | ..... | ..... |
| **Oregon:** | | | | | | |
| Astoria | Yes | Yes | Yes | ..... | ..... | ..... |
| Baker | Yes | Yes | No | 6 months | 3 cu. ft. | 6 cu. ft. |
| Portland | d | Some | No | ..... | ..... | ..... |

For footnotes, see page 356.

## TABLE NO. 5—STORM WATER INLETS.— Continued.

| City. | Are inlets at centers of cor. curve? | Is there a catch basin at inlet? | Is the outlet trapped? | Average frequency of cleaning, once in | Average amount of dirt removed Per cleaning. | Per year. |
|---|---|---|---|---|---|---|
| **Pennsylvania:** | | | | | | |
| Allentown | d | y | No | 6 weeks | 1/3 cu. yd. | ..... |
| Altoona | Yes | Yes | Yes | 4 months | ¾ cu. yd. | 2 cu. yds. |
| Beaver Falls | Yes | Yes | No | 3 months | 1 cu. yd. | 4 cu. yds. |
| Bellevue | Yes | Yes | No | 4 to 6 months | 5 barrows | ..... |
| Carbondale | e | Yes | Yes | 4 to 12 months | 1¾ cu. yds. | ..... |
| Catasauqua | Yes | No | No | ..... | ..... | ..... |
| Chambersburg | e | Yes | Yes | A month | 2 cu. ft. | ..... |
| Charleroi | d | Yes | Yes | After heavy storms y | 9 cu. ft. | 3 cu. yds. |
| Clearfield | j | No | No | ..... | ..... | ..... |
| Coatesville | Yes | Yes | No | 1 to 3 years | ..... | ..... |
| Connellsville | Yes & q | Some | Some | ..... | ..... | ..... |
| Coraopolis | Yes | Yes | Yes | After heavy rains | 1½ cu. yds. | ..... |
| Donora | Yes | Yes | Yes | 3 months | ½ cu. yd. | 2 cu. yds. |
| Du Bois | g | Some | No | 2 months | ..... | ..... |
| Duquesne | .... | Yes | Yes | 3 months | 2 cu. yds. | 8 cu. yds. |
| Erie | Yes b | Yes | Some | 3 months | ¼ cu. yd. | 1 cu. yd. |
| Freeland | .... | Yes | Yes | 2 months | ..... | ..... |
| Greensburg | e | Yes | Yes | ..... | ..... | ..... |
| Greenville | e | Yes | No | 4 months | Very little | ..... |
| Hanover | e | Yes | Yes | ..... | ..... | ..... |
| Harrisburg | Yes | Yes | Most | A month | ..... | ..... |
| Hazleton | e | Yes | Yes | 6 months | 2 cu. yds. | 4 cu. yds. |
| Hollidaysburg | Yes b | Yes | Yes | 2 months | ¼ cu. yd. | 1 cu. yd. |
| Homestead | Yes | Yes | Yes | 6 months | ½ cu. yd. | 1 cu. yd. |
| Jeannette | Yes | Yes | Yes | ..... | ..... | ..... |
| Juniata | .... | No | No | ..... | ..... | ..... |
| Kingston | Yes | Yes | Yes | 6 weeks | ¼ cu. yd. | 2 cu. yds. |
| Meadville | s | Yes | No | 3 months | 1/3 cu. yd. | 1½ cu. yds. |
| Miners Mills | Yes | Some | Some | 7 weeks | 1/3 cu. yd. | 2 cu. yds. |
| Norristown | d | Few | 95% | 4 months | 18 cu. ft. | 4 cu. yds. |
| Philadelphia | Yes | Yes | Yes | ..... | ..... | ..... |
| Pittsburgh | Yes b | Yes | Yes | ..... | ..... | ..... |
| Rankin | Yes b | Yes | Yes | 3 months | 1 cu. yd. | 4 cu. yds. |
| Reading | Yes h | Most | No | 3 months | 1¾ cu. yds. | ..... |
| Scottdale | e | Yes | Yes | ..... | 9 cu. ft. | ..... |
| South Bethlehem | .... | Yes | No | After each storm | ..... | ..... |
| Titusville | Yes | Yes | Yes | 6 months | 2 barrows | ..... |
| **Rhode Island:** | | | | | | |
| Providence | e | Yes | Yes | ..... | ..... | ..... |
| Warwick | Yes | Yes | No | 6 months | 1 cu. yd. | 2 cu. yds. |
| **South Carolina:** | | | | | | |
| Columbia | Yes b | No | No | ..... | ..... | ..... |
| Florence | Yes | Yes | No | 4 months | 1½ cu. yds. | 4½ cu. yds. |
| Orangeburg | c | Yes | No | 2 months o | ..... | ..... |
| **South Dakota:** | | | | | | |
| Lead | .... | Yes | Yes | 6 months | 2 barrows | ..... |
| Mitchell | Yes | Yes | No | 6 months | Very little | ..... |
| Sioux Falls | Yes b | 50% | Some | 4 months | 1 cu. yd. | 3 cu. yds. |
| **Tennessee:** | | | | | | |
| Jackson | .... | Yes | No | 6 months | 1 cu. yd. | ..... |
| **Texas:** | | | | | | |
| Austin | f | No | No | ..... | ..... | ..... |
| Beaumont | e | Yes | Yes | ..... | ..... | ..... |
| Houston | c | No | No | ..... | ..... | ..... |
| Laredo | Yes | Yes | No | A year | 2 cu. ft. | ..... |
| Longview | Yes | Yes | No | 6 months | 1 cu. yd. | 2 cu. yds. |
| San Antonio | f | No | No | ..... | ..... | ..... |
| **Virginia:** | | | | | | |
| Newport News | Yes | Yes | Yes | A month | ½ cu. yd. | 6 cu. yds. |
| Petersburg | Yes | Yes | v | After big rains | ..... | ..... |
| Richmond | j | Yes | Yes | ..... | ..... | ..... |
| **Washington:** | | | | | | |
| Aberdeen | z | Yes | Yes | 30 days | 6 cu. ft. | ..... |
| Vancouver | c | Yes | No | A month | 10 cu. ft. | 4½ cu. yds. |
| Walla Walla | Yes | k | Yes | 5 days | ..... | ..... |
| **West Virginia:** | | | | | | |
| Bluefield | f | Yes | No | 2 weeks | 1 cu. ft. | 1 cu. yd. |
| Fairmont | .... | Yes | No | 3 months | ..... | ..... |
| Moundsville | s | Yes | Yes | A year | 10 cu. ft. | ..... |
| **Wisconsin:** | | | | | | |
| Baraboo | .... | Yes | Yes | 3 months | ..... | ..... |
| Chippewa Falls | .... | Yes | No | A week | ½ cu. yd. | 27 cu. yds. |
| Eau Claire | Yes b | Yes | Yes | 3 months | ..... | ..... |
| Green Bay | m | .... | .... | ..... | ..... | ..... |
| Janesville | * | k | No | ..... | ..... | ..... |
| La Crosse | Yes | Yes | No | 3 months | ¾ cu. yd. | 4 cu. yds. |
| Marinette | Yes | Yes | Yes | 9 months | ..... | ..... |
| Merrill | Yes | Yes | Yes | 2 months | ..... | ..... |
| Neenah | Yes | Yes | Yes | 6 months | 2 cu. ft. | ..... |
| Oshkosh | c | Yes | No | ..... | ..... | ..... |
| Portage | .... | Yes | No | ..... | ..... | ..... |
| Superior | .... | Yes | Yes | 6 months | 6 cu. ft. | 12 cu. ft. |
| Waukesha | .... | Yes | No | 2 weeks | ..... | ..... |
| West Allis | Yes | Yes | Yes | ..... | ½ cu. yd. | ..... |
| **Wyoming:** | | | | | | |
| Sheridan | Yes & e | k | No | 2 weeks | ½ cu. yd. | 5 cu. yds. |
| **Canada:** | | | | | | |
| Brandon, Man. | f | Yes | Yes | A month | 1 cu. yd. | ..... |
| Edmonton, Alta. | Yes | Yes | No | A month | ..... | ..... |
| Hamilton, Ont. | e | Yes | No | 4 months | ..... | ..... |
| Kingston, Ont. | c h | No | No | ..... | ..... | ..... |
| Lethbridge, Alta. | e | Yes | No | A month | ..... | ..... |
| London, Ont. | g | Yes | No | A month | 0.1 cu. yd. | 1 cu. yd. |
| Port Arthur, Ont. | e | Yes | No | 6 weeks | ¾ cu. yd. | ..... |
| Stratford, Ont. | .... | Yes | No | A week | ..... | ..... |
| Toronto, Ont. | .... | Yes | Yes | A week | ..... | ..... |
| Vancouver, B. C. | e | Yes | Yes | A week | ..... | ..... |

†—See editorial for explanation. a—40% on property lines; 10% between corners. b—Also at property lines. c—At property lines. d—If grades do not converge, back of crosswalk. e—Back of crosswalk. f—Back of street line. g—About P. C. of curve. h—Also in middle of block. i—Clear sidewalk crossings 5 feet. j—Present practice away from corners. k—Corner inlets lead to combined catch basin and manhole on sewer line. l—Also 10 ft. back of inside of walk. m—5 feet from property line. n—Brickbats and rubbish. o—On paved streets. p—¾ cu. yd. per cleaning on dirt streets, cleaned 4 times a year. q—On one line of curb, not at angle. r—Within 3 feet of intersection of curb lines. s—Four to 5 feet back of intersection of curb lines. t—Where street flusher is used. u—Some on the curve; generally 8 ft. from street line. v—On combined sewers. w—Inlet back of each crosswalk connected to catch basin in curve. x—½ cu. yd. for each 600 lineal feet. y—On unimproved streets. z—20 feet back of property line on flat grades, at property line on steep grades. *—Generally under cast iron crossing plate.

## SEWERAGE STATISTICS FOR 1914.

(*Continued from page 349.*)

ft. of less than 10-inch; 2,165,700 ft. of 10 to 15-inch; 764,800 ft. of 16 to 24-inch, and 78,900 ft. of larger than 24-inch; a total of 8,075,000 ft.

Concrete pipe—85,200 ft. of less than 10-inch; 49,400 ft. of 10 to 15-inch; 54,400 ft. of 16 to 24-inch, and 193,800 ft. of larger than 24-inch; a total of 382,800 ft.

Concrete built in place—149,800 ft. of smaller than 36,-inch; 88,000 of 37 to 48-inch; 110,200 ft. of 49 to 72-inch, and 41,000 ft. of larger than 72-inch; a total of 389,000 ft.

Also 343,200 ft. of other kinds, of which 277,900 ft. was brick and most of the remainder was cast iron.

This gives a total of 1,740 miles of sewer laid in these cities last year.

It will be noticed that of this amount, about 64 per cent was smaller than 10-inch (mostly 8-inch), being the branch lines of house sewer systems. A considerable amount of vitrified pipe larger than 24 inches (most of it 30-inch) was laid—about 15 miles; but two and a half times as much concrete pipe of this size, a large percentage of it reinforced.

Although concrete has taken the place of brick to a large extent in sewer construction, we still find more than 5 miles of brick sewer constructed, as against 7½ miles of concrete built in place.

## SEWER STREET AT WICHITA

### Problem in Drainage Solved by an Open Channel Storm Sewer, Used as a Street All But Ten Days a Year.

By BERT C. WELLS.*

The part of Wichita, Kansas, known as College Hill is a residence section east of the Wichita drainage canal having an area of about three square miles. The east half of the district is high and rolling, while the west half along the canal is low and level. The storm water comes down rapidly from the high rolling ground and floods the low level portion, causing some damage and a great deal of inconvenience, especially during the rainy season of the year.

Near the center of the College Hill district a small ravine cuts the otherwise higher portion and extends for some distance back into the country, while upon reaching the lower level it disappears entirely. The drainage area of this ravine is over 1,000 acres of land which has a clay subsoil, practically impervious to moisture. Our rainfall here is about 30 inches per annum, the most of it falling in the spring and fall. Our heaviest rainfall on record was in 1911, when eight inches fell in 24 hours.

In the settling up of the College Hill district, the low level territory was built up first and no channel or place was left for carrying the run-off through the ravine.

Many plans have been proposed in the past twenty years for relieving the flooded territory, but all failed to meet with the approval of the people, the open channel plan being bitterly opposed by the resident who would be near it and the enclosed sewer plan was opposed by all because of the expense. The enclosed sewer would have to be of about 100 sq. ft. end area, as the grade of the sewer would have to be very flat.

In 1912 this office proposed the plan of building a large open sewer 40 feet in width, with curb walls 12 inches in height on either side and the center depressed about 8 inches lower than the sides, with a 3-foot diameter enclosed sewer beneath. The idea was that the open sewer would serve as a pavement in dry weather or in times of light rainfall while during heavy rains it would carry the storm water. The small sewer beneath would carry the melting snow, light rains, street washings, and the last part of the run-off which otherwise would run on the street for a day or so after a rain. This plan met with the approval of the majority of the property owners, and, with the exception of a small sewer beneath, the plan was carried out and has now been in use a year.

The sidewalks on the street were all removed and the entire width of 60 feet excavated, the walks being relaid 10 inches lower than originally, a coping being built back of the walk lines to retain the earth. Six inches drop was given in the width of the parking spaces; curb walls 1 foot in height were built with a 12-inch base to prevent overturning, then the remaining 40 feet in width was paved with 4-inch vitrified brick blocks on a 5-inch concrete base. At street intersections the edges of the pavement were raised 4 inches higher, leaving only 8 inches of a curb showing.

The pavement intersections were paved back 15 feet beyond the property lines, joining the original grade at this point.

At the drainage canal the depressed sewer was turned off at an angle of about 30 degrees and the grade of the center run down to about the normal water level of the canal, while the street paving was carried up in the street to meet the floor level of the bridge over the canal. A barricade was placed across the branch leading into the canal to prevent reckless auto drivers from going the wrong way and into the canal.

The total length of the sewer is 4,534 feet and cost in total, $60,141.80. The legal proceedings were carried through the same as for a sewer, the work being known as Storm Water Sewer No. 9. A group of remonstrators attempted to enjoin the work, alleging that it was not a sewer but a pavement in fact, but the courts held the proceedings to be legal and proper. We have not had an extraordinary rain since the sewer was completed but our largest rainfalls have only caused the water to rise 6 inches on the curb walls, making the center 14 inches in depth. The street does not make a bad appearance, the property adjoining is much more valuable than before, appearing to the eye to be nice, high ground.

About half way between the canal and the upper end of the sewer there is a grade school. In order that the school children may safely cross during high water, a foot bridge mounted on 2 wheels was built, the side rails being trusses supporting the footway. The janitor of the school is custodian of the foot bridge and when the water begins to hinder the crossing of the street, he wheels the foot bridge into place and the canal can be crossed dry shod. Possibly ten days in the year the sewer will have enough water in it to make it unfit for use as a street; at other times it is a good brick pavement.

Dodge City, Kansas, had a similar problem to solve and after carefully examining our street have paved theirs in about the same way.

The accompanying drawing is a typical cross section of the street.

*City engineer of Wichita, Kan.

TYPICAL SECTION OF SEWER STREET.

# SEWAGE PUMPING PLANTS

## Brief Descriptions of Plants Operating in Seventy-Five Cities—Operated by Steam, Electricity Gasoline and Compressed Air

Brief descriptions of plants used for the pumping of sewage by seventy-five cities of the country reporting are given in the following article, generally in the words of the city engineer or other officials making the report, so far as this is possible:

Los Angeles, Cal., does not pump sewage at present, but is contemplating a plant of 75,000 gallons per day with a lift of 27 feet.

Marysville, Cal., pumps all of the sewage, amounting to 600,000 gallons a day, the lift being 20 feet. The sewage collects in a sump, from which the pump removes it, emptying the sump in about an hour and a half, then resting two hours and a half; the operations being repeated about six times in 24 hours. The pump used is an 8-inch Byron Jackson centrifugal, operated by a 30 h. p. Westinghouse motor. Does not start and stop automatically but is operated by two men, one in a shift. Sewage is not screened before pumping. The plant has never given any trouble in operation. The cost of operation and attendance is about $4,500 a year.

(Unless otherwise stated, in each of the following the plant has given no trouble in operation.)

Hartford, Conn., pumps sewage from two small sections of the city which were formerly subject to flooding at times of high water in the Connecticut River. When operated, the lift varies from nothing to 20 feet. Pumping is begun when the river has risen to 10 feet above ordinary low water. The record flood is about 27 feet. The pumps are operated an average of twenty to thirty days a year. The older of the two stations has one motor-driven and one steam-driven 6-inch centrifugal pump. The new station has a Camden Iron Works centrifugal pump, direct connected by vertical shaft to a General Electric 2-phase 4-wire 60-cycle induction motor. There is one 4-inch sump pump with a capacity of 260 gallons per minute against a 20-foot head operated by a 5 h. p. motor; one 12-inch sewage pump with a capacity of 3,000 gallons per minute against 16½ foot head operated by a 25 h. p. motor, and three 24-inch storm water pumps having a capacity of 16,200 gallons per minute against a head of 16½ feet operated by 125 h. p. motors. The power for this station is purchased by contract for $1,200 per year. The 12-inch sewage pump is started and stopped automatically, but the three 24-inch storm water pumps are not. Before reaching the pumps, the sewage passes through 5 ft. by 9 ft. screens of ¾-inch bars placed 2¼ inches on centers. Plant is operated by three shifts of one man each at each of the two pumping stations; is operated about thirty days during the year, the men operating it being taken temporarily from other duties.

Long Beach, Cal., pumps sewage from three different districts, the average amount being 300 gallons per minute against a 21-foot head. One No. 4 Kroch and two No. 4 Worthington pumps are used, operated by 15 h. p. direct connected Westinghouse motors. Pumps start and stop automatically, pumping about three minutes and resting about two alternately. Sewage is not screened before pumping. Plant has given very little trouble. One man puts in about one hour per day to each pump. Cost of operation and attendance is about $400 per year per pump.

District of Columbia pumps practically all of its sewage, amounting to about 60 million gallons per day against a lift of 16 feet. There are also eight 65-million-gallon storm pumps which handle all the storm water from 900 acres of the city's area. Continuous pumping is performed by 65-million gallon submerged centrifugal sewage pumps operated by triple expansion direct connected horizontal pumping engines. Before reaching the pumps the sewage passes through a sedimentation chamber and duplicate screens. Force employed comprises three watchmen eight hours each, one steam engineer, one assistant steam engineer, two oilers and two firemen on each watch. The cost of pumping is about 10 cents per million foot-gallons.

Atlanta, Ga., pumps part of the sewage from Ansley Park amounting to about 130,000 gallons per day, the lift being 44 feet. The sewage flows into a storage tank of 15,000 gallons and is pumped intermittently, the pump starting and stopping automatically. The pumps are submerged vertical Worthington volute, in duplicate, with a capacity of 150 gallons per minute each, operated by two vertical induction motors of 7½ h. p. Sewage passes through a screen with bars 1½ inches apart and another with a ½-inch square mesh, before pumping.

Brunswick, Ga., pumps practically all of its sewage, amounting to 1,500,000 gallons a day, against a head of 20 feet. Pumping is not continuous, but for an average of about ten hours per day, when high tide prevents gravity discharge. A Worthington 12-inch centrifugal pump is used operated by engine, an engineer and assistant engineer operating same. Sewage is not screened before pumping. Cost of operation and attendance about $3,000 per year.

Lewiston, Idaho, pumps all of its sewage, amounting to 1,500,000 gallons, against a head of 24 feet during the high water in the Snake and Clearwater Rivers, this lasting for about two weeks during the spring. A Gould 12-inch sewage pump operated by a 40 h. p. Westinghouse motor is used. Sewage is not screened before pumping. Plant is operated by two men in 12-hour shifts. Cost of operation and attendance is about $1,500 per year.

Cairo, Ill., pumps its sewage amounting to about two million gallons per day against a head of 30 feet whenever the river rises above 330 feet elevation. There are three plants, one consisting of a Morris 20 x 20 and another 18 x 15 pump, a second plant 20 x 20 and a third 22 x 20. These are direct connected to motors with horse-powers of 150, 75, 150 and 125 respectively. Sewage is not screened before pumping. Each plant is operated by two men in 12-hour shifts. The first two pumps are generally sufficient to meet the situation, but in exceptionally long high water stages the other two plants are required also. The four pumps have capacities of 12,000, 7,000, 12,000 and 12,000 gallons per minute respectively. The two 20 x 20 pumps are direct connected, the other two are belt driven.

Chicago, Ill., pumps about 170 million gallons per day of its sewage against a head of 11 feet, the pumping being continuous. Steam driven submerged centrifugal pumps of 20 to 250 cubic feet per second are used, operated by horizontal condensing engines. About 85 per cent of the sewage passes through two coarse screens before entering the pumps. Generally no trouble is experienced in the operation.

East St. Louis, Ill., pumps all of its sewage during times of high floods in the Mississippi, lifting it from 1 to 18 feet. Pumping is necessary only when the river stage is 22 feet on the gauge, which occurs an average of sixty days per year. (No pumping was required during 1914.) The pumps used are five 48-inch centrifugals and two 36-inch centrifugals, Allis-Chalmers make, operated by five 3-cylinder 18½ x 20-inch stroke vertical Rathbun-Jones Engineering Company engines,

and two 15 x 23-inch gas engines. No screens are used. Plant is operated by a regular force of two engineers and one watchman, with two additional men when the pumping is long continued. Cost during 1914 (when no pumping was required) was $4,741.30.

Freeport, Ill., pumps a part of its sewage against a head of 13 feet during high water, using two centrifugal pumps with a capacity of 500 gallons per minute, motor-operated; the pumps starting and stopping automatically. Sewage is not screened before pumping. Oiling daily is the only attention required. Cost is about $300 a year.

La Grange, Ill., pumps about half its sewage, 600,000 gallons a day, against a 16-foot head. The pump operates intermittently, starting and stopping automatically as the sewage falls and rises in the pump pit. Century motors operate Yeomans Brothers and American Well Works centrifugal pumps. The sewage is screened to remove sticks and rags, but does not wholly do so and these materials have given trouble in the pumps. The attendance consists of about one hour per day to oil and inspect the pump. Cost of operation is about $1,500 a year.

Moline, Ill., has as yet done no pumping, but has under construction a 6-inch American Well Works centrifugal pump having a capacity of 1,080,000 gallons per day against a 37-foot head; pump to be operated by a G. E. vertical C. C. L. squirrel cage induction motor, 2-phase, 60-cycle, 440 volts, 680 revolutions per minute. The motor is to stop and start automatically. The sewage will pass through a bar screen with 1-inch openings.

Council Bluffs, Iowa, pumps a part of its sewage against a 4-foot head. The pumping is not continuous, but the sewer is allowed to fill and is pumped out every other day. The pump used is a centrifugal having a capacity of 5,000 gallons per minute against a 20-foot head and is operated by motor. It does not start and stop automatically. Sewage passes through a 1-inch mesh screen, and the clogging of these screens is the only trouble given by the plant. Two men operate the plant every other day.

Des Moines, Iowa, has three small plants now operating, and one under construction, the lifts being 55 feet, 45 feet and 25 feet respectively for the existing plants and 19 feet 10 inches for the one under construction. The pumping is not continuous, but is regulated by an automatic switch operated by a float. Morris submerged vertical 1½-inch and 2-inch pumps are used, operated by Warner motors of 2 h. p., 4 h. p. and 7½ h. p., and also two gasoline engines, one as an emergency alternative with each of the two smaller motors. There is a screen around each pump intake. The plants are reported as having given trouble with the pump bearing wearing out. They are operated by one man employed throughout the year and a second employed a part of the time. The plant now under construction will have a capacity of 6,530,000 gallons per day, to lift the sewage from a system of 15½ miles, built last year.

Hutchinson, Kansas, is now building a pumping plant for lifting all of the house sewage of the city against a 12-foot head, the amount averaging about one million gallons per day. The pumping will be intermittent, controlled by automatic float-controlled switches. There will be one 5-inch and one 6-inch pump operated by motors. Sewage will be screened through a ½-inch mesh screen.

Iola, Kansas, pumps about one-third of its sewage from six to ten hours per day depending upon the weather and the amount of water coming from the flush tanks. A motor driven air compressor operates an air pump with a capacity of 80 gallons per minute. Sewage is not screened. The plant has given very little trouble. It is operated by one man averaging eight hours a day at 25 cents per hour. Cost, about $900 a year.

Manhattan, Kansas, pumps its sewage when the river is high, which, however, has not happened during the past three years. The plant consists of a 1,500-gallon-per-minute Worthington centrifugal pump operated by a 75 h. p. G. E. motor. It does not stop and start automatically. Sewage is not screened. One man operates it when it is working.

Wichita, Kansas, pumps a very small portion of its sewage in two plants. One of these is a 4-inch Worthington volute motor-operated pump lifting against a 15-foot head; the pump operating for about twenty minutes three times every 24 hours. The other is a 2-inch Class C Worthington volute operating against an 8-foot head for about fifteen minutes twice every 24 hours. Pumps stop and start automatically; are visited once a day to see that they are working properly. Sewage is screened through a ½-inch mesh.

Alexandria, Iowa., pumps all of its sewage during flood stages in the river, about $1,500,000 gallons, including ground water, against an average head of 20 feet. Sewage discharges into the river by gravity until the river reaches a stage 16 feet above low water, when pumping is necessary, which usually averages about 90 days in the year. Motor driven Worthington centrifugal pumps are used. The plant does not start and stop automatically. Sewage is not screened. The plant has given very little trouble. It is operated by two men in 12-hour shifts. Power is obtained from the city electric plant; labor costs approximately $600.

Boston, Mass., pumps most of its sewage, lifting 96 million gallons a day against a head of 39.6 feet. Three vertical beam-and-fly wheel triple expansion Leavitt pumps, one with a capacity of 72 million gallons and two with a capacity of 35 million gallons each, are used; also two De Laval steam turbine centrifugal pumps with a capacity of 56 million gallons each. Sewage is screened by bar screens with one-inch spaces. Plant is operated by 48 men in three 8-hour shifts. Cost of operation last year, $82,175.

Clinton, Mass., pumps practically all of its sewage, amounting to 831,000 gallons, against a 59-foot head. The sewage flows into a storage reservoir and pumping is necessary only from eight to ten hours daily, the pump stopping automatically. A 12-inch De Laval centrifugal pump is operated by a 40 h. p. G. E. motor. The sewage is screened through a 1-inch lattice and 1-inch square mesh screen. It requires the service of one man about four hours per day. Cost of operation, about $2,300 a year.

Concord, Mass., pumps all of its sewage, amounting to 343,000 gallons per day, against a 70-foot head. The sewage flows into a storage well, from which it is pumped once a day, the average run per day for 1914 having been 7 hours and 42 minutes. The pump used is horizontal direct-acting compound condensing duplex steam pump, with 8-inch high pressure and 16-inch low pressure cylinders with two 12-inch water pistons with 18-inch stroke, manufactured by the Deane Steam Pump Company. Sewage passes through a bar screen of wooden bars 3 inches by ½ inch set on edge with ½ inch clear space between. Plant is located in the electric light station. Steam is taken from boilers of electric light plant and pumps are operated by the same employees. The cost for the year 1914 is given as $1,579.18.

Fairhaven, Mass., pumps a part of its sewage, about

100,000 to 115,000 gallons a day, but during the heavy rains in January, 1915, it reached nearly one million gallons. The sewage is lifted against a static head of 10 or 11 feet, but friction probably increases this to 30 or 40 feet. Shone ejectors are used, there being six 200-gallon ejectors and two 100 gallon. Air for these is furnished by a 5 x 8 x 12 Rand steam compressor at the power house, also a Blake 12 x 8 compressor. The only screening of the sewage is that effected by a grating at the inlet with holes about 5 inches square. The plant has given a great deal of trouble, especially this year. Three men in 8-hour shifts are employed throughout the year at a cost of $2,200; fuel oil and coal cost $900 to $1,000; water, $25; lubricating oils, $60.75; gas and electricity, $125; waste, $15, and repairs, $250.

Lynn, Mass., pumps some of its sewage against a head of 12 to 14 feet, using three centrifugal pumps operated by G. E. motors, and one Shone system. The centrifugals are stopped and started automatically. Sewage is rough screened. Plant is operated by one man eight hours a day and one man one hour a day. Cost of operation was $2,378 last year.

North Attleboro, Mass., pumps about one-quarter of its total flow, using two 3-inch centrifugal pumps operated by two 7½ h. p. motors, the pumps being started and stopped automatically. Sewage passes through bar screens and perforated plates. Plant is operated by one man fifteen to twenty minutes a day. It cost last year $400 for power, $75 for labor and $25 for supplies.

Norwood, Mass., pumps part of its sewage, about 30,000 gallons a day. Pumping is done every other day for an hour and a half, using two vertical submerged centrifugal pumps, operated by two 10 h. p. G. E. motors, stopped and started automatically. Sewage is screened through wrought iron rods spaced four inches apart. One-half hour inspection each day and two men one-half day each week cleaning the racks and oiling the motors is the only attendance required. Cost of operation, $225 a year.

Waltham, Mass., pumps 55,000 gallons of its sewage a day against a head of 29 feet, using a 5-inch vertical centrifugal pump, Lawrence make, operated by a Westinghouse 15 h. p. vertical motor squirrel cage type. The pump is started and stopped automatically, running an average of 117 minutes at nine different intervals a day. Sewage passes through screen bars one inch apart. Attendance consists of one hour twice a week, except for cleaning; total attendance cost $127.53 last year and total operation, $780.84.

Worcester, Mass., pumps a small portion of its sewage against a lift of 185 feet, using a 3-inch submerged centrifugal pump and Shone ejectors, the pump being operated by two 12 h. p. gasoline engines and 15 h. p. motors. The motors are arranged to start and stop automatically. Plant requires attendance of one man eight hours a day. Cost of operation, about $5,000 a year.

Grand Rapids, Mich., pumps all of its sewage during high water in the river, amounting to about 20,000,000 gallons a day against an average lift of 10 feet. Pumping is necessary for about one month during the year. The pumps used in the four pumping stations are Buffalo Steam Pump Company's centrifugal, motor-operated. Sewage passes through coarse screens only. While pumps are operating three men in 8-hour shifts are used at each of the four pumping stations. The cost of operation per year is about $6,000.

Kalamazoo, Mich., pumps part of its sewage, about 892,400 gallons a day, against a head of 24 feet. A 6-inch Advance centrifugal submerged pump is used, automatically controlled, which pumps on an average 15 hours out of each 24. Sewage is not screened at all before pumping. Plant is visited by an attendant once a day. Maintenance cost, $600 a year.

Albert Lea, Minn., pumps about 600,000 gallons a day against a 5-foot to 6½-foot head. Three Shone ejectors are used, two 50-gallon and one 100-gallon, and a 6-inch centrifugal pump. The last is operated by a 7½ h. p., 3-phase motor; the ejectors by a Westinghouse air compressor. The pump is stopped and started automatically. Sewage is screened through one-inch by two-inch openings. Ejectors have given no trouble, but the centrifugal pump has. The attendance consists of oiling valves and ejectors once a week.

Chisholm, Minn., pumps all of the sewage, as it comes from the Imhoff tanks, to a percolating filter, the amount being about 350,000 gallons a day and the lift 34 feet. The American Well Works vertical centrifugal pump, 750 gallons per minute capacity, is operated by a Sprague G. E. 10 h. p. vertical motor. (There are also five vertical centrifugal pumps, capacity 50 to 100 gallons per minute, in the sewer to raise sewage from 7 to 14 feet.) These are operated automatically by floats. The plant is stopped and started automatically, pumping five minutes and resting ten minutes. Plant is operated by two men working on night and day shifts. Cost of operation, $3,600 a year.

Mankato, Minn., pumps only in case of extremely high water, when the lift may equal 20 feet, this occurring only once in three or four years. For this purpose it has one 8-inch vertical centrifugal and one 18-inch vertical centrifugal, operated by one 15 h. p. and one 60 h. p. Triumph induction motor. Sewage is not screened at all. Plant is operated by one man when run.

Stillwater, Minn., pumps sewage from one small system against a head of 12 feet during high water in the river; this being from two to five weeks in some years, in other years not at all. A 4-inch centrifugal operated by a motor is used. Sewage is not screened. Plant is operated by two men in night and day shifts.

Vicksburg, Miss., formerly pumped sewage when water in the river reached 35 feet, but now pumping is unnecessary. It used a 16-inch Worthington pump operated by a 50 h. p. motor. The pump was operated about 90 days in the year at a cost of $1,800.

Yazoo City, Miss., pumps all of its sewage for about five months of the year against a head of 25 feet. A centrifugal pump belted to a motor is used. The pump operates three times a day, being started and stopped by hand. Sewage is not screened at all. Plant has given very little trouble. Cost of operation per year, about $550, regular power plant force attending to it.

Kansas City, Mo., has three sewage pumping plants; the Santa Fe street plant in the West Bottoms; the Prospect avenue plant in the East Bottoms, and the plant in Sewer District 395. The Santa Fe plant is composed of two 36-inch motor driven Worthington centrifugal pumps, each having a capacity of 30,000 gallons per minute. They lift the sewage 22 feet. This plant operates only during the high water stages of the Missouri River, usually from three to four weeks in the month of June. Plant cares for an area of about 500 acres. The Prospect avenue plant consists of one 24-inch single-suction centrifugal motor driven American pump, making a lift of 16 feet. It has a capacity of 18,000 gallons per minute and operates only during high water stages of the river. These two stations have no automatic starting or stopping devices. The pump for District 395 is a 6-inch Worthington vertical standard, centrifugal volute and handles the sanitary sewage only for an area of 69 acres. The lift made is 25 feet. This pump has an automatic starting and stopping device and so

does not require constant attendance. No available figures have been kept on cost of maintenance of these plants.

St. Charles, Mo., pumps its sewage during very high water in the river, which has not occurred during the past three years. The lift is 15 feet. The pumps are American make operated by one 8 h. p. and one 10 h. p. Stanley G. E. motors, which start and stop automatically. Sewage is not screened.

Asbury Park, N. J., lifts about 750,000 gallons per day at the septic tank against a head of about 11 feet. Pumping is continued during the day in the winter time and both day and night in summer. Two 6-inch, one 8-inch and one 10-inch centrifugal pumps are operated by motors. Sewage is not screened. Plant has given very little trouble. Is operated by one man.

Atlantic City, N. J., pumps all of its house sewage. The plant is operated by a private company.

Millville, N. J., does not now pump sewage, but expects to install a pump this year for lifting final tank effluent against a 15-foot head during high tides. The amount pumped will be about two million gallons, which will probably be operated automatically by motor.

Morristown, N. J., pumps about one-quarter of its sewage, 250,000 gallons a day, against a 50-foot head, using Ansonia ejectors operated by G. E. motors and Clayton air compressors. Sewage is not screened. Plant has given some trouble in operation. There are four stations which are all cared for by one man. Annual cost of maintenance, $4,911.

Newark, N. J., pumps part of its sewage, 12,400,000 gallons a day, against a head of 16 feet. A plunger pump, steam operated, is used. The sewage passes through coarse screens. Plant is operated by 3 engineers, 4 firemen and 2 laborers. Annual cost of operation, $15,500.

Plainfield. N. J., pumps a part of its sewage, about 154,000 gallons a day, against a 16-foot head, and may install another plant for pumping 720,000 gallons against a 24-foot head. The present plant uses pneumatic ejectors at four stations, operated by Wagner motors. Sewage is not screened at all. Only minor troubles have been experienced in operation. Plants are operated by one man spending one hour morning and night at each station. Annual cost of operation, $2,000.

Ridgewood, N. J., pumps 40 per cent of its sewage, 70,000 gallons a day, against a head of 102 feet. It has two units, each a 7 x 8 Goulds triplex plunger pump operated by 25 h. p. A. C. motor. The pumps are stopped and started automatically, generally pumping about one hour and stopping one hour. Sewage is not screened before pumping. Plant is operated by one man. Annual cost, $2,500.

Albuquerque, N. M., pumps about two-thirds of its sewage against a head of 13½ feet, about 4,000,000 gallons per 24 hours, using two 10-inch vertical centrifugal Worthington pumps operated by Wagner vertical motors. Sewage passes through ¾-inch screen. Plant has given very little trouble. One man looks after this plant and also several smaller pumping plants.

Saratoga Springs, N. Y., pumps three million gallons per day against a head of 18 feet, using R. D. Wood & Company's 6-inch centrifugal pump, motor-operated. Sewage passes through a screen of ¾-inch rods on 1¾-inch centers. Plant is operated by one man a part of each day, costing $810 a year. Power cost $2,506 last year.

Wilmington, N. C., pumps a small part of its sewage, about one million gallons per day, using two 6-inch centrifugal pumps which are stopped and started automatically. Sewage is screened through a 1-inch grating. Plant operated by one man one hour a day.

Bismarck, N. D., pumps about 200 gallons a day against a 12-foot head, using a centrifugal pump, capacity 50 gallons per minute, operated by a 2 k. w. (2.7 h. p.) motor which is stopped and started automatically. Sewage is not screened. Plant has given considerable trouble.

Minot, N. D., pumps part of its sewage, about 75,000 gallons a day, against a 20-foot head, and expects to install a one-million-gallon plant this year. Sewage is allowed to collect and back up into sewer, thus starting pump, which operates about four hours every two days. A 6-inch Alberger volute pump, motor-operated, is used with automatic starter. Sewage is not screened.

Columbus, Ohio, pumps all of its sewage and 10 per cent of it twice, lifting 20 million gallons per day against a 30-foot head. It uses a 12-inch Worthington single stage, single suction horizontal centrifugal; a 20-inch Morris single stage, double suction horizontal; two 18-inch De Laval single stage, double suction horizontal and one 12-inch De Laval single stage, double suction horizontal. These are all operated by G. E. motors, A. C., variable speed. The sewage is screened through vertical bar screens with one-inch clear opening, followed by another with half-inch clear opening. Some trouble has been given by sand and coarse material in the pumps. The plant is operated by 7 men working in 8-hour shifts, 3 in one shift and 2 in each of the others. The plant has just been changed from steam to electric drive, and no cost data of the latter are yet available.

Dayton, Ohio, pumps a part of its sewage, two million gallons a day, at two stations with 5.4 feet and 8.8 feet lift respectively; using two pair of 600-gallon Shone ejectors and two pair of 340-gallon; the air being supplied by engines at the water works pumping station. Coarse screens are placed at the entrance to the manholes. In addition there are three storm water and sewage pumping stations used only at flood stages of the river, consisting of electrically driven centrifugal pumps. The plant is inspected once each day. Power is estimated to cost $3.50 a day.

Fostoria, Ohio, pumps all the sewage, about 700,000 gallons a day, against a 40-foot head. Pump operates twice a day, three hours each time, the pump well filling between times. Pump is a Goulds No. 8 centrifugal open impeller operated by a 60 h. p. Buckeye steam engine. Sewage passes through a ¾-inch basket screen. Plant is operated by one man, operation costing $1,200 a year. The city expects to install a three-million-gallon pump in the plant this year, which will pump at intervals of three to five minutes into an Imhoff tank now being built, using electric power to operate a closed impeller volute pump.

St. Marys, Pa., pumps all of its sewage, 300,000 gallons, against a 14-foot head, using two centrifugal pumps, capacity 400 gallons per minute each, operated by 10 h. p. electric motors. The pump is operated during eight hours of daylight only. Small amount of screening before pumping. Plant is operated by one man at $50 a month, other expenses amounting to about $400 a year.

Chambersburg, Pa., pumps all of its sewage, 1,400,000 gallons a day, against an 18-foot head, using 8-inch vertical centrifugal pumps driven by 15 h. p. vertical 3-phase induction Westinghouse motors. Pumps start and stop automatically as the well fills, averaging about ten minutes' rest and eight minutes pumping. Sewage passes through a rough screen. Plant is operated by two men in 12-hour shifts. Annual cost of operation about $3,000.

Lebanon, Pa., pumps all its domestic sewage, about 700,000 gallons a day, against a 13-foot head, using a 6-inch Buffalo centrifugal pump operated by a 5 h. p. Hawthorne induction motor, which is stopped and started

automatically. Sewage passes through grit chambers to Imhoff tank. Plant is operated by four men in 12-hour shifts, costing $6,000 a year; additional cost of operation, $3,500.

Meadville, Pa., pumps part of its sewage, 1,500,000 gallons, against a 17-foot 9-inch head, about twice a year when water in the outlet stream floods, when the pump is operated from three to seven days at a time. A Worthington centrifugal 10-inch volute pump is driven by a Westinghouse D. C. 22 h. p. 550 volt, 34 ampere, 540 r. p. m. motor. Sewage is not screened. Pump has given trouble occasionally when there is a variation of flow. During pumping two men operate the plant in 12-hour shifts. Cost of operation, about $150 a year.

Reading, Pa., pumps all sanitary sewage, about six million gallons, against a 38-foot static head, the pump being in operation about 90 per cent of each day. R. D. Wood 12-inch and 15-inch centrifugal pumps are driven by type H. F. Westinghouse motors of 100 and 150 h. p. respectively, which are started and stopped automatically Sewage is screened through ½-inch perforations in a grid. Plant is operated by three engineers and three pitmen in 8-hour shifts.

Washington, Pa., pumps all sewage to its treatment plant, amounting to 1,400,000 gallons, against a 20-foot head, using one 8-inch and two 5-inch Brooks centrifugal pumps, operated by one 25 h. p. and two 15 h. p. Gardner horizontal gas engines. Sewage is screened through two bar screens with ⅝-inch and ¼-inch space respectively. Plant is operated by one man. Annual cost of operation, $2,650.

Providence, R. I., pumps about 90 per cent of its sewage, lifting about 24 million gallons a day against a head of 27 to 30 feet. Centrifugal pumps are operated by three triple fly wheel condensing and one cross compound condensing engines; and a small plant in which a centrifugal pump is operated by an electric motor. The small plant is started and stopped automatically. The sewage is screened. Large plant requires one chief and two assistant engineers and 15 men in three shifts. Small plant requires part time of one man.

Sioux Falls, S. D., pumps 5,000 gallons a day against a 30-foot head, the pump operating three times in 24 hours, about five minutes each time, starting and stopping automatically as the sewage rises. A 3-inch centrifugal pump is direct connected to a G. E. 3-phase, 15 h. p. motor. Sewage is screened by a small screen on inlet pipe to receiving well. Attendance amounts to one-half hour a day. Annual cost of operation, $100.

Austin, Texas, has two small lift stations in operation, both equipped with Shone ejectors. Districts served by these plants have at present only a few sewer connections and total amount pumped by both stations is not over 5,000 gallons per day. The Rio Grande street station is equipped with two 150 g. p. m. Shone ejectors operated by two 8 x 6 Clayton compressors and two G. E. 5 h. p., 60 cycle, 220 volt, 3-phase induction motors. Lift at this station, 7 feet 6 inches. The East avenue station is equipped with two 200-gallon Shone ejectors operated by two 8 x 8 Marsh compressors driven by two G. E. 7½ h. p., 60 cycle, 220 volt, 3-phase induction motors. Lift here is 18 feet. Ejector plants are inspected twice per month and the compressor plants are inspected once every two days. Both compressor plants are controlled by automatic pressure switches. Sewage is passed through a 4-inch mesh screen before entering the ejector.

El Paso, Texas, pumps 3½ million gallons per day against a 25-foot head with Morris centrifugal pump connected to both engine and motor. Sewage is screened through a ½-inch mesh. Plant is operated by three engineers and eight assistants, cost of operation being about $10,000 per year.

Houston, Texas, pumps part of its sewage, about 1,500,000 gallons, against a 55-foot head, using two 12-inch Morris centrifugal pumps operated by American and Ball engines. Sewage is screened through a 1¼-inch mesh. The attendants consist of a chief engineer, and three shifts of two men and one helper each.

San Antonio, Texas, pumps sewage from 250 acres against a 30-foot head, using two 10-inch centrifugal pumps, motor-driven, which start and stop automatically. Sewage passes through coarse screens. Plant has not yet been put into operation.

Newport News, Va., up to 1906 pumped its sewage at a cost of about $4,500 a year, but has now eliminated this by using an inverted siphon.

West Allis, Wis., pumps about 1,000 gallons a day against a 15-foot head, the pump starting automatically about once an hour and pumping for a few minutes. A Simplex ejector is used, operated by motor. Sewage is not screened before pumping. Plant has given no serious trouble. Ejector and air compressor are in fire station and motor is run from light circuit, so cost of operation is practically nothing.

Poplar Bluff, Mo., expects to install this year a pump of 72,000 gallons capacity against a 10 to 20-foot head, using two motor-driven pumps of 150 and 350 gallons per minute respectively, the larger of which will stop and start automatically. .

Edmonton, Alta., Canada, pumps part of its sewage against a 50-foot head, using a duplicate installation of motor-driven centrifugal pumps controlled automatically by float. Plant has given very little trouble; is visited by a sewer maintenance man once a day.

Hamilton, Ont., pumps a portion of its sewage, about 9,470,000 gallons, against a maximum head of 22 feet, using centrifugal pumps with 6-inch to 10-inch discharge operated by direct acting steam engines and Canadian Westinghouse motors of 75 h. p. Sewage passes through bar screens with one-inch clear space. The plant is operated by eight men, whose wages amount to $7,000 a year. The city proposes to install this year another plant with a capacity of six million gallons per day against a 40-foot head.

Stratford, Ont., pumps all its sewage, 900,000 gallons, against a 17-foot head, using an 8-inch Canadian Foundry turbine pump, 750 r. p. m., operated by a 10 h. p., 220 volt, 3 phase, 25 cycle induction motor, started and stopped automatically. Sewage first passes through septic tanks and screens. Plant is operated by one man. Annual cost of operation, $700.

Toronto, Ont., pumps about 40 per cent of its sewage, nine million Imperial gallons, against an 18-foot head, using two vertical centrifugal pumps with a capacity of 12 cubic feet per second each, and one with a capacity of 36 cubic feet per second, operated by 3 phase, 25 cycle variable speed vertical motors, two of 75 h. p. and one of 200 h. p. Sewage passes through screens with ½-inch bars and ½-inch spaces, which is cleaned automatically. Plant is operated by six men in 8-hour shifts. Annual cost of operation, $16,000.

Vancouver, B. C., uses two temporary and one permanent installation with a capacity of 620 gallons per minute for a 25-foot lift. The permanent installation consists of Yeomans vertical submerged 3-inch and 6-inch pumps operated by 3 phase, 60 cycle, 220 volt motors, which are stopped and started automatically by a Cutler-Hammer switch. Sewage reaching small pump is screened, that for larger pump is not. One man on full time looks after the three plants. Annual cost of operation about $3,000.

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Contributions suitable for this paper either in the form of special articles or of letters discussing municipal matters, are invited and paid for.
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MARCH 18, 1915.


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## Storm Water Inlets.

Information concerning storm water inlets to sewers, contributed from 340 cities, is given in Table No. 5 of this issue. In addition to this, a considerable number furnished sketches or descriptions of the inlets, which will be made the subject of an article in another issue. The majority of cities use catchbasins for receiving water from the street—inlets which contain in the bottom a basin for retaining dirt. Others have a pipe leading directly from inlet opening to sewer, or at most a shallow basin with outlet at the bottom, so that no dirt is retained in it; but many have transferred to these latter also the name "catchbasin," although they catch and retain no dirt. To learn which kind was used in each city, we asked whether "dirt catchers" were used in the inlets, thinking the meaning would be clearer than if the word "catchbasin" were used. Apparently it was not, for a number replied that they had none, but stated further that they were cleaned at certain average intervals of time and there is therefore some question about a few of the replies given in the second column of the table. We have accordingly interpreted the answers for this column in connection with the other replies from the same city; in some cases possibly incorrectly, although these are very few, we believe.

Taking the answers as stated in the table, we find that 249 use catchbasins, 39 use plain inlets, and 31 have some of each. A number explain their reasons for using or not using, or the conditions under which either kind is used; which reasons are given on another page. Further reasons are given in the last three columns. Some cities report some, at least, of the basins cleaned only once in one, two or even three years. If a basin is not filled to a point requiring cleaning in two or three months of a rainy season, it does not receive enough dirt to make its presence necessary. If it fills but is not cleaned, it might just as well (and better) not be used at all—it would be better to fill it with dirt and put in a concrete bottom flush with its outlet. In a few cases the basins are found at every cleaning to contain only a half inch or so of slimy dirt, which could have been carried away through the sewer, saving the cost of cleaning the catchbasin and the odors from it.

Another objection to the catchbasin is that the water standing in it serves as a breeding place for mosquitoes, and may freeze in winter and rupture the basin. The former is considered so serious in many cities that oil is placed in each basin after rains or at intervals of a week during the rainy season.

Traps are reported used by 142 and not used by 143 cities, while about 40 use them in some cases. These also serve as mosquito breeders. Their purpose is to prevent odors from the sewers reaching the sidewalks, and this is called for in too many sewers. But a sewer which is well designed and built and kept clean gives off no odors and needs no traps. In the case of combined sewers this condition is difficult to maintain; many of the older sewers, also, are so constructed that deposits are inevitable. But a trap is a confession that matters in the sewer are not as they should be. Its presence prevents an abundant ventilation which would do considerable to prevent the accumulation of foul air in the sewers, unless conditions are very bad.

## Standard Definitions of Terms.

Two weeks ago we published a list of definitions of terms used in road work, recommended for acceptance as standards by the American Society of Civil Engineers. A similar service should be rendered by some society in connection with sewerage terms; an illustration of the necessity being offered in the preceding editorial. Exactly what is an inlet, a catchbasin, a trap? And what is the proper name for sewers which carry the water which enters through catchbasins, and what for sewers which carry water coming from houses? And what for the dirty water that flows in each?

These are a few of the terms which should be standardized. To us the proper terms and definitions seem clear, and yet our views are not shared by all, to judge by the literature on the subject. Nevertheless, we propose setting our own ideas down here, and following them ourselves and recommending them to others until better reasons are given for adopting others.

An inlet is any structure receiving water from the street. It consists essentially of an opening in the gutter (gutter inlet) or in the curb face (curb inlet) or between the rails of a track (track inlet), and a pipe leading from this to the sewer. This is a plain inlet. The opening is always covered with an inlet grating when in gutter or track. If there is a basin below the opening to catch dirt, it is a catchbasin inlet, or simply catchbasin; the portion below the outlet pipe being the catchbasin. There may be a slab or iron casting in the catchbasin to prevent air from entering from the sewer, which is generally called a trap. Or the outlet pipe from a

catchbasin or the pipe of a plain inlet may have a depression (running trap) which holds water and serves the same purpose. These may be distinguished as basin trap and pipe trap.

A sewer which receives rain water from the street only is generally called a storm water sewer or storm sewer, and the water which flows in it is called storm sewage or surface water. But some call these "drains" —a palpable misnomer, in our opinion, which confuses this purpose with that of draining subsurface water from land. Subdrains are properly so named, for they are to remove ground water; but drain tile, used for this purpose, are certainly not suitable for constructing these so-called "drains." Storm sewers certainly do not drain the ground (unless incidentally), but remove storm water. To call them drains is incorrect and leads to confusion with real drains, which are designed to take in water through the joints.

The sewage which is discharged into sewers from houses is called by the same engineers "sanitary sewage." Some liquids are entitled to be called sanitary ("tending to preserve health"), but to apply this term to that under discussion seems to us the height of absurdity. As well call rat poison a sanitary food, because it removes rats, which sometimes carry germs of disease. "House sewage" is a shorter term and describes it exactly—it is the sewage which comes from houses. Consequently "house sewer" may be applied to the sewer which carries this liquid. The only objection we can think of to this use of this term is that it is also used to describe the pipe from house to sewer; but this may, and we think should, be called a "house connection"; just as the pipe from a catchbasin to sewer is called a "basin connection."

We wish that every one who writes reports on sewerage matters or speaks of them would consider the above carefully, and if the arguments seem sound, adopt the terms and meanings given; or, if they do not meet their approval, would write for publication their own views on the subject.

### Trained Sewer Plant Attendants.

In its annual report for last year, the State Board of Health of New Jersey recommends that attendants of sewage disposal plants should be required to secure a license, and that this be given them only after they have received special training and demonstrated their fitness for the work. "The process of sewage treatment falls," said the board, "particularly in the fields of the sciences of physics, chemistry and bacteriology. These are subjects about which the ordinary laborer knows nothing, yet most of the plants in the state are operated by ordinary laborers." Each unit of a plant should be tested at frequent intervals, the tests being physical, chemical and bacteriological, if the highest degree of efficiency of a sewage disposal plant is to be obtained. And yet, of the 150 sewage disposal plants in New Jersey, only one had a trained man as a manager. This one has long been tremendously overloaded, and, had an ordinary laborer been in charge, would have become a nuisance long ago and the city been compelled to extend it by new construction; but this expense it has postponed by the employment of a competent manager.

We hearily commend the recommendation of the State Board of Health that attendants of sewage disposal plants, not only in New Jersey, but in every state, should be licensed by the State Board of Health. We suggest, as an extension of this idea, that there be at least two grades of licenses, one for the ordinary attendant and another for manager; the former to apply to those put in daily charge of small plants which cannot afford and do not really require the *constant* services of a competent manager, but which should employ a part of the time of such manager, the licensed attendant having immediate charge of the plant under his direction. Either a number of neighboring towns could combine and employ a manager between them, or each could make individual arrangements with a competent licensed manager.

## SCHOOL BOY FORESTERS.

By KARL W. DETZER.

School boys at Fort Wayne, Ind., trained under the direction of the City Forestry Department, have been made deputy city foresters, and in the past few months have completed a very thorough survey of the trees of the city and reported their finding to property owners and the city officials.

Only the public schools have been used in the experiment, and boys of from twelve to fifteen years of age have been enlisted in the work. They are taugnt the more common varieties of scale and tree and shrub diseases by an experienced instructor and by representatives of the park and forestry departments.

As soon as a serious case of scale is discovered the boys report it to the forestry department and to the principal of their school. An expert is sent to look at the trees, and the city board notifies the property owner. Then a group of older boys at the high school, who have formed a stock company and purchased a spraying kit, are told of the case, and these boys attempt to make arrangements with the owners to give the affected trees a spraying. This latter set of boys make from $5 to $20 a week after school and on Saturdays taking care of shade and fruit trees.

The results have been remarkably successful, and few property owners who find that their trees are in bad condition object to paying for the treatment. Of course, the city has several gangs of men at work spraying the higher trees and handling the park work, but the boys are given all the trees under twenty feet high, and all shrubs and bushes.

## THE SAURIAN SEWER CLEANER.

The alligator story reaches us from all quarters—its spirit haunts us and perhaps we can lay it by giving it further publicity; for which there has been added the inducement that we can now quote an authority for it.

An Erie, Pa., paper states that Theodore Eichhorn, superintendent of streets of that city, is in correspondence with a New York firm which has offered to supply him with an alligator to be used in cleaning sewers; this firm breeding and training alligators in Florida and supplying them for any size of sewer.

The idea is to start an alligator through a sewer head first. Being in a position a little too cramped to turn around, the animal will crawl until he reaches a manhole. A rope is to be tied around the alligator's body, and as he moves he will drag a scraper. While not an expert on alligators, Superintendent Eichhorn thinks it probable that they have both the determination and strength to force their way through any sewer obstruction. We are informed that Dayton, O., has ordered some assorted sizes on trial.

The idea apparently originated in Jacksonville, Fla.—at least our first report of it came from there. The first sewer-cleaning saurian was raised, we belive, in the Jacksonville Keeley Cure Institute—they are more common than snakes in Florida.

# The WEEK'S NEWS

**State Highway Work in New York and Connecticut—Paving Decisions in Springfield, Ill., and New Brunswick, N. J.—Street Maintenance Revenue in Philadelphia—New Jersey Cities May Divert Water—Hard Fires in Boston and Woburn, Mass.—New Motor Fire Apparatus—Commission Victories in New Jersey—Iowa Cities Lose Home Rule—Taxing Powers of Ohio Cities—New York and Philadelphia Fight Snowstorms—"Jitney" News—Begin Philadelphia Rapid Transit—Chicago's Progress on Exhibit.**

## ROADS AND PAVEMENTS

### New York State Highway Plans.

Albany, N. Y.—Seven hundred miles of highways are to be constructed by the State Department of Highways this year and plans and specifications for a number of short roads in different sections are already prepared and awaiting the advertising for bids which will be announced shortly so that contracts can be awarded in April. With the $10,000,000 appropriated for use during 1915, the highway department expects to add a chain of short roads to the sections of roads already constructed, which will at once satisfy the demands of residents of different parts of the state who have been clamoring for improved highways, and make it possible to follow through routes without detours. The policy of Edwin Duffey, the new Commissioner of Highways, will be to adhere to three separate types of roads only: Waterbound macadam, bituminous macadam and brick roads. No experimental highways are to be built and it is said there will be little or no opportunity for patented road material. Great progress and increased mileage of the good roads system have been made since 1898, when there were but two or three miles of state highway. Records of the highway department show that in 1914 there were 6,000 miles of improved highways. Economy is to mark the administration of Highway Commissioner Duffey. He has already cut down his office force and it is understood reductions in the field force will follow. In order to prevent the alteration of specifications or the making of supplemental agreements after a contract has once been let, great care is to be exercised in the preparation of the specifications.

### Utilities Board Has No Powers Over Paving.

Springfield, Ill.—The state public utilities commission has entered an order in the matter of the complaint of E. V. Orvis, of Waukegan, against the Chicago and Milwaukee Electric Railroad Company regarding the indebtedness of the railroad for the assessment for paving of about $20,000, saying that it has no jurisdiction in the matter, which it declares is one for the courts to decide. The Marion street paving assessment is the one which the company always has refused to pay. It has won out so far in the courts.

### Loose Specifications Invalid.

New Brunswick, N. J.—Because of the loose method of the city in advertising for bids for paving streets, the Supreme Court has refused to compel Mayor Austin Scott to sign contracts awarded to Thomas H. Riddle. Riddle sought a writ of mandamus to compel the mayor to approve the contracts. No particular kind of pavement was specified and bids were invited for vitrified brick, granitoid asphalt, wood block, bitulithic or other suitable material. Westrumite was selected and this was later changed to concrete. The court said it was not necessary to decide whether so broad and loose a way of inviting bids can ever be justified, but the mayor was justified in refusing to approve the contracts.

### Proposed New Revenues for Street Maintenance.

Philadelphia, Pa.—Chief Connell, of the bureau of highways, in his annual report, recommends a vehicle tax and an increased charge for keeping building material in streets as two means of obtaining increased revenue sufficient to keep all streets in good condition. Connell points out that those taxed would really be the first beneficiaries, although the public generally would also enjoy the benefits. In the opinion of Connell, the two suggested means of increasing revenue for street maintenance would, with the $500,000 paid annually by the Rapid Transit Company for the purpose, go far to solve the problem of maintaining the streets. The tax on vehicles might be in two grades, one to apply to all kinds of vehicles excepting automobiles and the other to include only automobiles. He thinks an average tax of $8 a year for vehicles and $15 a year for automobiles would be reasonable. There is now a law which fixes a state tax on automobiles and which prohibits another tax on such vehicles by the city. In reference to the tax on building material Chief Connell says that at present this tax is 25 cents a month, but it should be $5 a month. He justifies this opinion by saying that the occupancy of streets by building material usually means the shutting off of street space of 80 or 100 feet long by 9 feet wide. On the basis of the taxes he recommends, Chief Connell estimates a net revenue to the city for street maintenance of about $302,340 annually, or $299,468 more than the city receives in license and permit fees from such sources at present. At present the bureau of highways has supervision of $5,764,323 of the city work and care of city assets amounting to $109,000,000.

### Street Work in Superior.

Superior, Wis.—It cost the city of Superior $359,232.66 for paving and other improvements during the fiscal year ending January 31, according to an annual report of the Board of Public Works. Over four miles of streets were paved during the year at a cost of $192,658.90. Nearly ten miles of sewer pipe was laid at a cost of $108,077.90. Over twelve miles of cement sidewalks were laid at a cost of $33,868.48. Expenditures on miscellaneous contracts, for bridge construction and other work, amounted to $4,940.55. The maintenance and repairs to the streets cost $25,517.78.

### The Connecticut State Highway Department.

Hartford, Conn.—In the biennial report of Highway Commissioner Charles J. Bennett for the term from February 26, 1913, to October 1, 1914, he says that Connecticut's highway system, extending over a period of twenty years, stands well up in the list of states as regards highway development and is as near completion as in any other state. The Commissioner believes there should be more co-operation between the towns of the state and the Highway Department. Outside the cities of the state there are about 12,000 miles of highways, of which about one-tenth has been constructed in nineteen years at a cost of $12,000,000. Highway work in Connecticut is divided into three parts: Construction of highways, repairs of highways and accounting and records, the heads of these departments holding conferences with the commissioner on all important matters. The construction department under the deputy commissioner, who acts on all matters for the commissioner in his absence or disability, has control of the construction of new highways alone. The deputy commissioner makes frequent trips to the headquarters of division engineers and all construction work is advertised under the unit system. The department of repairs, or maintenance, which the commissioner says is unquestionably the most important feature of the work, is separated from the construction so that the men in charge may devote their entire time to repairs.

Under the superintendent of repairs the state is divided into nine districts, each in charge of a supervisor. These districts are more numerous and do not coincide with the engineering divisions of the construction department, because construction work is generally being carried on where roads are not built up. The department is considering increasing the number of repair supervisors in order to get more frequent examination of existing roads. It has been

impossible, so far, to build up any standard system of maintenance for roads and to choose between a patrol system and a section gang system. With reference to the department of accounts and records, the report says that success "depends" primarily upon the simplicity and completeness of its accounting system. A recapitulation of the state aid funds available in the different towns shows a total of $1,270,324.46. The total state appropriations for 1913 and 1914 were $3,422,000, of which $1,000,000 was for state aid and $2,000,000 each for trunk line and new repairs and for old repairs. The fourth largest appropriation was $150,000 for deputies, engineers and inspectors. For the period covered by the report, twenty months, a grand total of $612,267.99 was received in automobile license money collected by the Secretary of State. A list of the highways completed and paid for before Feb. 26, 1913, shows that the total net mileage of state roads was 922.13, and the work completed by the present department between Feb. 26, 1913, and Oct. 1, 1914, was 297.71 miles and a total mileage of reconstruction of 63.92, or a total mileage of roads constructed and reconstructed during the period of report of 360.63, not including various roads accepted by the department as being in good condition and turned over to the repair department without reconstruction. The total mileage of state road construction by the highway department from its inception to last Oct. 1 is 1,212.54 and a number of roads have been completed since then. The trunk line system of Connecticut is a layout of main roads amounting to about 1,520 miles. Of this about 60 per cent. are already constructed, and in the apportionment of the last appropriation for trunk lines the money was used to complete, so far as possible, seven roads which were considered to be the main routes of the state. The Commissioner recommends the general theory of separating the construction of roads into three types. For roads of extremely heavy travel not already constructed, the principle of constructing so-called permanent pavements should be adhered to. For roads of lighter travel with a preponderance of automobiles, the use of a bituminous-bound native-stone road, built either by the penetration or the mixing method, is recommended. For roads subjected to light travel, mixed in character, the construction of gravel or native stone macadam road is urged.

## SEWERAGE AND SANITATION

### Sewer Operations in Bay City.

Bay City, Mich.—According to City Engineer Henry C. Thompson the department has laid more stress on the construction of sewers and sidewalks than on pavements. No pavements were built during the year, while 21,417 feet of sewers and 87,380 feet of sidewalks were constructed. The cost of the 87,380 feet of sidewalks was $44,512.13. With the completion of the sewer construction work last fall Bay City has 612,480 feet, or about 116 miles, of sewers. A synopsis of totals for sewers laid during the year is as follows: Length, 21,417 feet; estimated cost, $20,596.32; contract, $20,440.25; engineering, $268; inspection, $1,471.75; advertising, $230; excess, $175.08; 30 per cent., $4,206.64; total cost, $22,585.08. Of this 30 per cent will be charged to the city and 70 per cent to the taxpayers.

### Strike on Passaic Valley Sewer.

Newark, N. J.—With neither side showing any signs of yielding, a strike of some 150 workers is holding up work on one of the local sections of the Passaic Valley sewer system. The strikers want a union wage scale of $4, $3.50 and $3 per day, respectively, for miners, helpers and muckers. Their present wage scale is $3.60, $2.70 and $2.50. The disgruntled men are employed by Booth & Flinn, Inc., of New York, working on contract No. 7.

### Report on Sewage Disposal.

Mansfield, O.—Frank A. Barbour, sanitary engineer, of Boston, Mass., and E. G. Bradbury have submitted to Service Director Orra Hursh and the city council plans and estimates for the proposed enlargement of the sewage disposal plant. The present plant, placed in operation in 1902, has long been felt to be inadequate and immediate action is necessary. The plant has capacity enough to handle only the sewage of what is known as the high level district, amounting to approximately 500,000 gallons a day, while the sewage from the low level district, approximately 1,900,000 gallons a day (dry weather flow) is not handled through the disposal plant, but passes directly into the Rocky Fork stream. In the plan for the proposed enlargement it is provided that the present plant be repaired and improved at an estimated cost of $5,500, then devoting the old plant entirely to the handling of the sewage from the high level district, which it is estimated within ten years will reach 750,000 gallons a day. Repairs at the station, including a new motor, a new screen and other general repairs, it is estimated, will cost $3,650. The bulk of the proposed expenditure will be for an entirely new plant of 2,000,000 gallons a day capacity for the handling of the city sewage from the low level district, which it is estimated will cost $85,600, bringing the total to $94,870. Whereas in the old plant septic tanks and contact filters of cinders were used, the plans for the new plant provide for the use of Imhoff tanks and sprinkling filters of crushed stone. In 1902, when the plant was placed in operation, only 1,414 premises were connected with the sewer, in 1914 3,933 premises were connected. In 1902 the dry weather sewage flow was 755,000 gallons a day; in 1907, 1,050,000 gallons a day and in 1914, 1,900,000 a day.

### City Saves With Day Labor.

Duluth, Minn.—A saving of $1,200 will be made by the city in the construction of the Catlin Avenue sewer, according to the commissioner of public works, F. C. Tomlinson. The city is doing the work by day labor. The greater part of the work has been completed and the total cost of the job will not be more than $5,000, says the commissioner. The lowest bid submitted by contractors was $6,200.

### City Wins Twelve-Year Sewer Fight.

Mount Carmel, Pa.—After more than twelve years of litigation the Mount Carmel authorities have won their fight to compel the Philadelphia and Reading Coal and Iron and more coal companies to furnish the borough with proper sewer outlets by cleaning the creek channel of culm. The State Waterway Commission ordered the coal concern to begin work on the project before March 9 or the commission will arrange to do the work at the expense of the companies. Twelve years ago the borough officials brought suit against the coal companies to prevent them from turning culm into the creek channel and to force them to remove the deposit that had blocked the creek in such a manner as to close many of the borough's sewers. The case was fought in the courts, decisions were rendered and appeals taken until an appeal was finally made to the Waterways Commission. It is estimated that the work will entail an expenditure of $75,000. In addition the coal companies were instructed to reimburse the borough $9,100 for damages sustained by culm washing upon public property.

## WATER SUPPLY

### Cities May Divert Water.

Trenton, N. J.—The rights of Jersey City and five other municipalities along the river to perpetually divert water from the Passaic River or its tributaries was affirmed by the Court of Errors and Appeals. The other municipalities involved are Kearny, East Newark, Glen Ridge, Bayonne and Harrison. The right to divert claimed by these municipalities, together with the Montclair Water Company and the West Orange Water Company, was challenged by the city of Paterson, which attacked the condemnation proceedings by which the municipalities and water companies sought to acquire Paterson's public rights in the Passaic River. Such rights were claimed by Paterson because of its ownership in park lands and a fire engine house fronting upon the river. In defense of its position, Paterson, through former Governor John W. Griggs and City Counsel Edward F. Merrey, contended that the properties involved, having been already devoted to public

purposes, could not be condemned for other public uses. In holding this contention fallacious, Chief Justice Gummere said the proposition advanced by Paterson was not sustained by the facts. The Legislature, he added, in its grant to the municipality to establish a system of public parks, conferred no power upon it to impose any right of public user upon the waters of the Passaic.

### Dynamite Blast Breaks Main.

Philadelphia, Pa.—Three million gallons of filtered water rushed from the Queen Lane reservoir plant when a blast of dynamite, used in street grading, broke a 48-inch main. The flood did little damage as it rushed down the hill, except to cut a ravine in the street. It took an hour to shut off the water.

### City to Buy Water Works.

Menomonie, Wis.—An agreement has just been reached between the city council and the Menomonie Water Works Company for the transfer of the utility from corporation to municipality for the sum of $100,000. It will still be necessary to go through the court proceedings that were started some months ago in accordance with the vote at the special election a year ago, when the people approved of the plan to purchase the plant. Instead, however, of fighting the proceedings, as it has been doing, the company will offer no resistance and judgment will be taken by stipulation. It is planned to complete the transfer by October 1, 1915. The city will issue 5 per cent. bonds in the sum of $100,000, to be retired in twenty years at the rate of $5,000 a year. The company has a $16,000 a year income from which operating expenses and interest is paid and a saving of $7,000 a year made. The council now levies $6,000 a year to pay the rental on the 121 hydrants used and sees its way clear to maintain the plant and meet the annual obligations without increasing the annual levy.

### New Reservoir Completed.

North Adams, Mass.—The new Beaman basin is rapidly filling up and the water in the big dam is now only about eight feet from the top. It is estimated that there are already more than 20,000,000 gallons impounded in the basin, although it is only about half filled. Much of the water in the reservoir came down from the hillside on its own watershed, but a quantity also came through the cement conduit from the upper Notch reservoir. Water has been run into the basin several times and run off again through the spillway for the purpose of cleaning the bottom. The work of running the pipe line from the Beaman basin into the Broad Brook main at Greylock has also just been completed, and the new system will soon be in service. The illustration gives a panoramic view of the reservoir.

### City Wins Water Suit.

Salt Lake City, Utah.—Decision in favor of Salt Lake was rendered by the district court in the case of the city against Francis M. Lyman, Jr., and title is quieted in the city to thirty second feet of the surplus flow of Parley's canyon stream, which Lyman sought to secure for power purposes. It was feared that if Lyman succeeded in establishing his claim to this water it would preclude the city from constructing its proposed 1,002,000,000-gallon reservoir at the canyon forks, but decision of the court assures the construction of this reservoir, which is a part of the proposed system to increase the city's water supply. The city, in 1901, filed upon all the surplus waters of Parley's creek to be used for filling a gigantic storage reservoir which it was then planned should be constructed at the intersection of the main canyon and Mountain Dell canyon. In 1910 Mr. Lyman filed on thirty second feet of the flow for power purposes. His claim to the flow was allowed by the state engineer over the protest of Salt Lake. The court holds that the city is entitled to the full flow of surplus waters under its appropriation for municipal purposes and that Mr. Lyman's claim for thirty second feet of this flow is not a valid claim. Hence the action of the engineer is annulled.

### Declare Water Impure.

Pittsburgh, Pa.—Residents of towns in the Beaver Valley are testifying before the Public Service Commission in support of the charges against the Beaver Valley Water Company, that the service is inadequate, that rates are discriminatory and exorbitant and that, because of irregular pressure there are frequent times when no water is to be had for the suppression of fires. It was also charged that the water is unfit for use for culinary and drinking purposes. It was declared that some patrons of the company paid 32 cents per 1,000 gallons, and that others paid as high as $1.20 for the same amount. Engineers agreed that the cost of reproducing anew the trunk lines and distributing system, reservoir tanks, power filtration plants, general properties and meters owned by the company would be $984,018.16. John D. Cole, chief of the Rochester fire department, testified that Rochester is without a sufficient supply of water to combat fires. Chief Cole said that on the occasion of a fire in the Rochester High School on February 24, 1914, the water pressure was only 60 pounds and the water could not be thrown to the roof of the building.

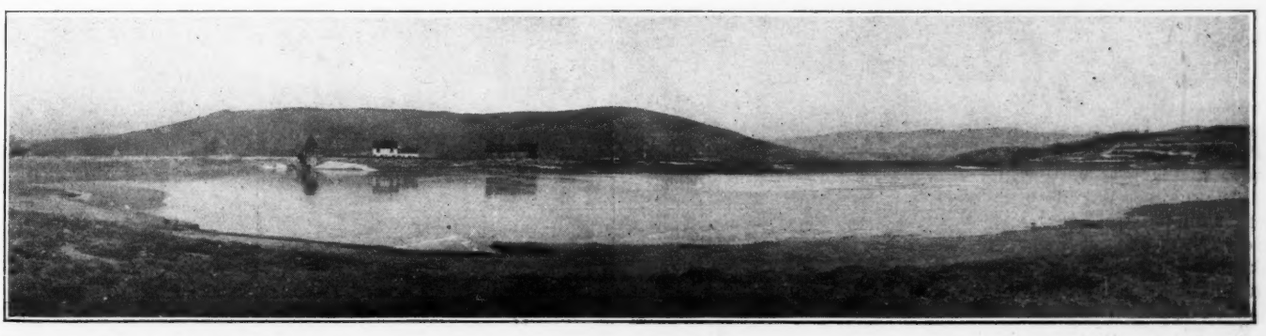
## STREET LIGHTING AND POWER

### Municipal Plant Reduces Rates.

Bellefontaine, O.—Rates for electric current from the municipally owned plant in Bellefontaine have been reduced. Investigation just completed revealed that the charge being made for current was higher than necessary to pay running expenses and furnish free street lighting. For illuminating purposes the flat rate of 8 cents per kilowatt has been repealed and a sliding scale from 7½ to 6 cents adopted. For power purposes the rate has been 4 cents, but the new rates range from 3 to 2 cents, according to the amount used. There is no minimum charge and no meter rental. Consumers who pay their bills within the month they fall due get a 10 per cent. discount.

### To Have Municipal Light Plant.

Houston, Tex.—Houston will construct a municipal electric light plant at once, according to a statement made by Mayor Campbell. It will be located at the city water plant and the current will be used to operate some of the machinery at the water plant and to light the numerous new bridges that the city has recently constructed and also to light the city auditorium, the city hall and the police sta-



Courtesy, North Adams (Mass.) Transcript.

BEAMAN RESERVOIR OF NORTH ADAMS.

tion. All of the new concrete bridges are equipped with many clusters of ornamental lights, and these form a considerable item of expense. When the city's light plant is completed the city hall square and possibly the market square will be equipped with ornamental lights of the cluster variety, and it is possible that the "white way" will be extended to some of the other business streets. This plant will be separate from the larger one that the city expects to build on the water front, near the turning basin, for use in operating wharf machinery in the city's wharves.

### New White Way.

Newark, N. J.—Many thousands of people celebrated the new "White Way." There was a parade of a thousand and a banquet at which Mayor Raymond was the principal speaker.

## FIRE AND POLICE

### Most of Boston's Apparatus At Fire.

Boston, Mass.—One of the worst down-town fires in years swept through the five-story marble-front Rice Building causing a loss estimated in excess of $200,000 and for two hours endangering the surrounding blocks. Twenty-four firms were burned out, water poured into the new Dorchester subway, reaching a depth of two feet at one point and for a short time threatening a serious cave-in; basements of nearby buildings were flooded, street car traffic was interrupted and four firemen were injured. The bulk of the city's apparatus was called out by the five alarms. The fire was most difficult to handle because of the high wind, the dense black smoke and the almost constant explosions. It was fought in freezing weather. The smoke was so thick that the men running the deck and wagon guns could not see without the aid of acetylene searchlights. One of the firemen sustained a fractured collarbone by being struck by a falling hose-coupling.

### Policewomen in New Jersey.

Trenton, N. J.—Gov. Fielder has signed the bill to allow the appointment of women as police officers.

### New Police Signal System.

Holyoke, Mass.—The new police signal system, installed by the Star Electric Co., has been tested by City Marshal John R. Harrington, who said that everything seemed to work perfectly. Patrol and ambulance calls came in without a hitch, he said, and he was convinced that the system would prove highly satisfactory and be accepted. City Marshal Harrington is recommending a new signal call light system which is being experimented on in New York.

### Fight Difficult Chemical Fire.

Woburn, Mass.—Fire in the reset building of the Merrimac Chemical company in North Woburn, near the Wilmington line, threatened the entire plant, valued at $2,000,000, and caused a loss estimated at $200,000. The melting of a number of lead vats and the escape of thousands of gallons of sulphuric acid made it an exceptionally hard fire to fight, and made the fighting ground in the vicinity of the fire practically unattainable from streams of hot acid. Hundreds of feet of hose were destroyed and numbers of firemen received minor burns about the hands and face from splashing acid. The fire was one of the most spectacular in the history of the city. A general alarm was sounded, followed immediately by second and third alarms. The blaze started from an unknown cause in the second story of a wooden structure. Warned of the danger of the 10,000 gallons of acid enclosed in vats made of hundreds of tons of sheet lead, the firemen made every effort to prevent the fire from spreading, but had to abandon ladders and hose when the huge vats melted sending the hot acid in great streams out of the building.

### Legislation for Police Pension Funds.

Harrisburg, Pa.—A bill compelling every city, borough and township in the state to pay 4 per cent. of all license fees, of whatever character, to associations operating police pension funds, has been introduced in the legislature. Such associations, however, must be designated by ordinance to be the official organization of the city, borough or township. The purpose of the bill is to place the police pension funds of Pittsburgh and Philadelphia on a good financial basis. The act provides that money paid to such asociations can be disbursed only for the following causes: Injury of a member while in the discharge of his duty; incapacity of a member to perform his duties for any other reason and after 10 years' service; pension to be paid after 20 years' service; pensions to the widow and children of any member killed or who dies from injuries received while performing his duty.

## MOTOR VEHICLES

### New Chemical in Commission.

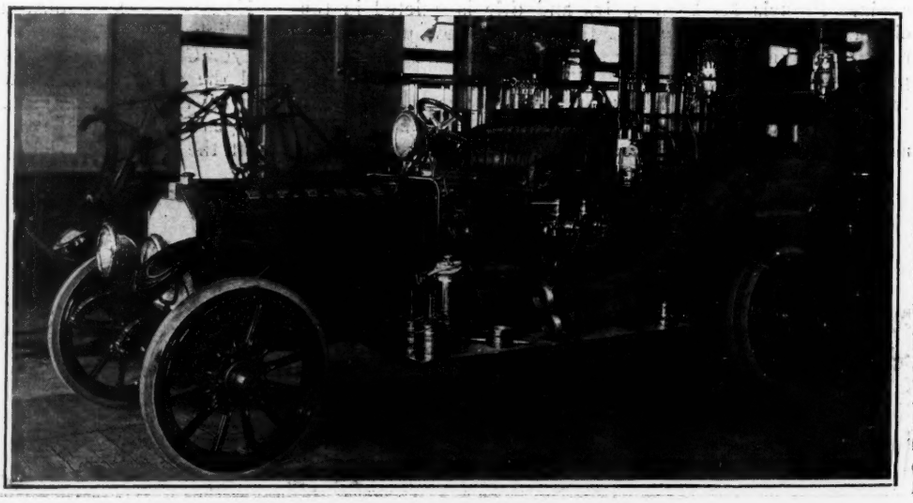
Florence, Ala.—The old fire wagon which has done duty in this city for the past twenty years has been supplanted by a bright red combination chemical of 72 horsepower. The outfit cost $4,500.

### New Pumping Engine Received.

Binghamton, N. Y.—The automobile pumping engine built for the Binghamton Fire Department by the American-LaFrance Company, of Elmira, arrived in this city about two months ahead of time. The new pumping engine is maroon in color with gold striping and lettering. The pumps have a capacity of 800 gallons per minute. The apparatus carries 1,200 feet of hose and is equipped with two extension ladders, axes, bars and hand chemicals. It is a ninety-horsepower machine. After being thoroughly tested by Chief Hogg it will be placed in commission. The illustration shows the new apparatus in the Central Station.

### New Chemical and Hose Wagon Bought.

Eugene, Ore.—Another automobile fire truck will be added to Eugene's equipment and the fire horses will be placed in the street cleaning service. The city council have purchased a Buick truck for $1,450. Fire Chief Harry D. Briggs will install a 35-gallon chemical tank on the truck, besides 150 feet of chemical hose, 700 feet of two and a half inch water hose, 200 feet of inch and a half water hose, one 20-foot extension ladder, 110 feet of roofing ladders and two three-gallon Babcock extinguishers. The new



Courtesy, Binghamton (N Y.) Press.
BINGHAMTON'S NEW PUMPER.

truck will be used for ordinary calls to fire and the big heavy truck will be used only in case of big fires. Chief Briggs says that the purchase of this truck will mean a big saving in the expenses of the department as the new machine can be maintained for $60 a year, whereas it has cost the city on an average of $635 a year to keep the horses and buy new ones during the past eight years.

## GOVERNMENT AND FINANCE

### More Commission Victories in New Jersey.

New Brunswick, N. J.—The city has voted for the adoption of the Walsh commission government act by a vote of 2,583 to 1,765. In 1913, at the last commission town election, the vote stood 1,880 for to 1,937 against.

Bayonne, N. J.—Bayonne's third effort to get commission government was successful by a majority of 756. The election was made spectacular by hundreds of women wearing wide yellow sashes with the slogan "Votes for Women," who were active at each polling place taking a straw vote on the question of suffrage. They handed each voter a ticket on which was printed three questions on woman suffrage. Announcement was made that 1,800 of the cards had been filled out, that eighty-five per cent. were in favor of equal suffrage, five per cent. opposed and the other noncommittal. The voting stood 3,418 to 2,662. On two other occasions Bayonne rejected the commission rule proposition, the first time by a majority of 5 and the second time by 299.

### New Charter Defeated.

Ely, Minn.—After an interesting election the new charter lost out by 61 votes. A total of 417 votes were cast.

### Home Rule for Iowa Cities Defeated.

Des Moines, Ia.—Representatives of rural districts defeated in the lower house of the Iowa legislature the bill that would have given home rule to the cities and towns of the state. The vote was 34 for the measure and 59 against it. Several legislators from the city districts aided in killing the measure. Under the bill cities and towns were given the right "to exercise local self-government subject to such specific restrictions as to particular powers as now or may hereafter be established by law."

### Reject Municipal Ownership but Elect Its Ticket.

Seattle, Wash.—Although the voters rejected a proposal to extend division "A" of the municipal car line and a proposal to connect division "A" and "B" by motor-buses, advocates of municipal ownership are claiming a victory. Alpheus F. Haas and Thomas H. Bolton, who favor municipal ownership, were elected councilmen by large majorities. Josiah Collins, so-called business men's candidate, ran a poor fifth, and H. E. Kennedy, who announced himself a conservative, received less than half as many votes as the leader. Haas, the only councilman re-elected, has voted with the municipal ownership group during the past year.

### Ohio Cities Have No Taxing Authority.

Columbus, O.—Cities have no authority whatsoever in determining the amounts they may raise by taxation to carry on their activities by an opinion of Attorney General Turner given to the house of representatives committee on taxation. The opinion is based upon a recent decision of the supreme court. It holds that there is not a constitutional law on the statute books relative to the present organization of county budget commissions and that it will be necessary for the legislature at once to enact emergency legislation to cure the defects, in order that taxes may be collected. It is held to be unconstitutional for any official other than an elective county official to be a member of the budget commission. This bars the mayor and city solicitor, as in the case of Columbus and other large cities, from serving on the budget commission and having a voice in determining the amount of money to be raised to operate the city.

There never has been a legally-constituted budget commission provided for in the state, the attorney general holds. The first commissions were provided for under the original Smith 1 per cent. law, and the mayor of the largest municipality was to be a member of the commission, together with the county auditor and the prosecuting attorney. The Smith law provision was declared by the larger municipalities to work an injustice to them by giving the county the majority representation on the commission. In order to relieve the situation, the Kilpatrick law was enacted in 1913, changing the personnel of the budget commission to the county auditor, the mayor of the largest municipality and the city solicitor in counties where the value of city property exceeded that of the rural, and in counties where the value of rural property exceeded that of the city, the president of the school board of the largest municipality was to take the place of the city solicitor. The last budgets were made up under the Kilpatrick law provision with the majority representatives being city officials. Validity of this method was contested by the prosecuting attorney of Hamilton County. The supreme court upheld him in this contention that the city solicitor could not act as a member of the budget commission, because the solicitor was not a county official. The court's decision also applied to the right of mayors to serve on the budget commission, holding that they were not proper officers, also. As most of the budgets had been completed or were nearing completion before the court's decision was rendered, the court held that the budgets were legal, inasmuch as the work of de facto officers, in this case the mayor and city solicitor, was legal.

## STREET CLEANING AND REFUSE DISPOSAL

### Tackling the Snow Storms.

New York, N. Y.—Street Cleaning Commissioner Fetherston's emergency army of snow cleaners had their first experience of "snow-fighting." Although the snow was wet traffic was impeded and the commissioner decided to put his reserves at work beginning at midnight of the first day of the storm. Ten thousand reserves and 3,000 regulars worked eight hours on the first shift and 10,000 the second. The streets were cleared in a day, and in most cases the snow was flushed down the sewers. Where the flow of water was too low the snow was carted to the rivers and dumped. Contractors' trucks numbering 600 and 1,200 carts of the department were at work. "The way the snow was removed," said the commissioner, "proves that the new system of using the sewers, of fighting the snow from the beginning of the storm, and of putting big emergency armies into the streets while the snow is falling is cheap and effective, and the results have been highly satisfying." It was estimated that the storm cost $200,000. Seventy-five miles of streets were cleared by means of snowplows attached to the motor busses. The emergency men were paid at the rate of $2.40 a day, which in the case of squads which had done good work, was increased by a bonus to $3.20.

Philadelphia, Pa.—Under the combined assault of 1,380 men, 190 teams and 33 snow plows the snow which covered the entire city quickly vanished from the central business district and from the principal streets and crossings in the outlying sections. The snow was flushed into the sewers from the fire plugs. In the central part of the city, where traffic conditions are heaviest, Chief Connell, of the highway bureau, placed 510 men of the regular street cleaning force, with forty teams. Augmenting this force were 320 men, furnished by the special snow removal contractors, together with 120 teams, 30 horse-drawn plows and 3 motor-driven plows. In the outlying sections, 550 of the municipal force, with 30 teams, were engaged in cleaning the crossings.

### Testing Incinerator Costs.

Amsterdam, N. Y.—Tests are being made at the incinerator plant here to determine the cost of fuel for the disposal of a given amount of garbage. In one of the tests it required 450 pounds of hard coal and 1,650 pounds of soft coal to dispose of 59 tons, 1,400 pounds of garbage. It is estimated that the fuel cost will amount to about four dollars per day.

## RAPID TRANSIT

### Jitney Invades Philadelphia.

Philadelphia, Pa.—Philadelphia has a jitney bus. The owner said that he was competing with the taxicabs and that he would be followed by summer by 500 more jitney busses. He had no franchise, but said city hall officials had told him to go ahead.

### Jitney Regulations in Los Angeles.

Los Angeles, Cal.—The jitney bus ordinance which has been hanging fire for several weeks has been approved by the city council. The ordinance obliges drivers to post an indemnity of $5,000 to protect passengers in case of accident. Persons of any nationality or race must be accepted as passengers. The Auto Bus Drivers' Association made a hard fight on this point, but the council decided that the jitney bus, as a public utility, could make no discrimination against negroes and Chinese. Jitney busses may, if they desire, deviate 3 blocks on either side of their chosen route. No mention was made of the number of passengers that could be carried and no limit was placed upon the fare that might be collected.

### Municipal Railway Very Busy.

San Francisco, Cal.—These are prosperous days for the Municipal Railway. Recent daily totals are: Friday, $6,-031.65; Saturday, $13,421.20; Sunday, $6,825.75; Monday, $8,446.40—$34,725 in four days. It is anticipated that on some of the big exposition days the Municipal Railway will take in close to $20,000. About 150 cars were run on the four days mentioned and the city lines were not taxed to their capacity. The Municipal Railway has 168 large cars on the new roads and 29 of a smaller kind on the Union street line. Superintendent Cashin says that he is assured of the ability of the Municipal Railway to handle the exposition travel.

### $6,000,000 Beginning for Philadelphia Transit.

Philadelphia, Pa.—Mayor Blankenburg has signed the $6,000,000 transit ordinance framed by councils' finance committee, ignoring the plans of Director Taylor, and passed by both councilmanic branches. This action was taken with a view of getting a start on the important transit project. While the ordinance does not meet with the approval of either the mayor or director of transit, they felt, they said, that it afforded a start. They expressed confidence that after the project is under way, the public will demand such additional features in the plans as to make the system virtually the same as originally planned by Director Taylor. Mayor Blankenburg signed the ordinance in accordance with the recommendation of Director Taylor and the unanimous approval of the independent members of both branches of councils who voted against the passage of the ordinance. These members of councils, with a few exceptions, and Director Taylor, conferred with Mayor Blankenburg before he signed the ordinance. The $6,000,000 will provide for a beginning of the work.

## MISCELLANEOUS

### Exhibit of Chicago Progress.

Chicago, Ill.—The City Club of Chicago is presenting to the citizens an interesting exhibit of the history, growth, present conditions and future plans of the city. Some interesting figures have been worked out. Twenty-two per cent., or 48.2 square miles, of the entire area of the city is occupied by the streets. There are altogether 1,451 miles of dirt highway, 531 miles of macadam, 659 miles of asphalt, 166 of brick, 41 of creosote blocks, 101 of granite, 12 of concrete and 30 of asphalt macadam. In the exhibit is a replica of the "city hall" of 1837, which was in a saloon. The police stations of the city are shown as dark, foul and unsanitary buildings in contrast with what modern jails should be. The exposition shows that about 3,588 acres of land is being used for recreational purposes, while the schools occupy and control 557.79 acres. Fully 1,128 acres are being held for investment purposes by the governing bodies. The excellent parks of the city seem to balance some of its deficiencies, however.

### Galveston's New Park.

Galveston, Tex.—The name of Michael B. Menard, the Texas pioneer, who was the founder of the city of Galveston, if any one man may be so designated, is to be perpetuated. Menard Park is the title officially selected by the Galveston city commission for the new municipal park on the beach, and so it will be formally christened at the dedicatory ceremonies in the near future.

### Wants Cities to Do Own Work.

Salt Lake City, Utah.—Senator W. Mont Ferry's bill providing that city or town boards may make improvements or do municipal work without advertising for bids or letting contracts has come to the senate with a favorable report from the committee on county and municipal corporations. The committee recommends an amendment, however, to provide that in case of work being done which is to be paid for by owners of abutting property, where the cost is under $2,000, the time for advertising for bids may be cut from twenty to not less than five days and notices may be posted instead of advertised; the posting to be done not less than five days before the bids are to be opened. City Attorney H. J. Dininny, who spoke in favor of the bill, said that under the present law as interpreted in a recent decision of the Supreme Court no city or town in Utah had the legal right to sprinkle, clean streets, repair a water main or lower pipes for paving or repair or grade dirt streets unless it advertised for bids. The bill, he said, would mean a saving of the expense of advetising for bids, preparing contracts, the contractor's profits and would also be a saving through the purchase of materials, which he said the city could get cheaper than the contractor because the city paid cash, while the contractor waited until he was paid before settling his bills for materials. He also argued the bill would give the city the right to employ resident heads of families on needed improvements.

### Municipal Art Commission for St. Louis.

St. Louis, Mo.—An ordinance creating a municipal art commission has been passed by the council. It will consist of nine members, as follows: President of the board of public service, ex-officio; commissioner of parks and recreation, ex-officio; director of city art museum, ex-officio, and one architect, one painter, one sculptor, one landscape architect, and two other residents of the city, the six members last designated being appointed by the mayor. Of the six members first appointed by the mayor, two will be appointed to serve for one year, two for two years, and two for three years, and after the expiration of their respective terms of office, their successors will be appointed each for a term of three years. The commission will serve without compensation and will elect a president and a vice-president, whose terms of office will be for one year and until their successors are elected and qualified. It will be the duty of the commission to make recommendations to the board of aldermen and to the board of public service regarding the location, design and decoration of any public building, bridge, fountain, arch, lamp post, stained glass, tablet, statue, gateway, fence, monument, or memorial of any kind of a permanent character and location and no such public structure or monument shall be erected or installed in any public place, or removed, relocated or altered in any way until the plans therefor have been submitted to the commission and the recommendation of the commission, or a majority thereof, have been made to the proper authority. The lines, grades and plotting of public grades will be subject to like approval by the commission. Such recommendations must be made within a period of thirty days from submission, and failure to make recommendations within that period will make the decision of the commission unnecessary. The provisions of this ordinance will not apply to any building or property owned or controlled by the board of directors of the Saint Louis Public Library, the board of education or the board of control of the city art museum.

# LEGAL NEWS

## A Summary and Notes of Recent Decisions—Rulings of Interest to Municipalities

**Establishment of Fire Limits—Police Power.**

City of Monticello v. Bates.—An ordinance which creates fire limits is within the police power of the city and is designed to prevent the erection of inflammable buildings in congested districts, thereby lessening danger from fire to adjoining and nearby property.—Court of Appeals of Kentucky, 173 S. W. R., 159.

**Streets and Alleys—Abandonment.**

Schultz v. Stringer et al.—Where some of the streets and alleys of an incorporated town were not originally needed, but as the town grew became necessary for the convenience of the public, nonuser was not enough to constitute an abandonment unless coupled with affirmative evidence of an intention to abandon.—Supreme Court of Iowa, 150 N. W. R., 1063.

**Improvement Assessments—Interest.**

Board of County Com'rs of Oklahoma County et al. v. Seymour.—The owner and holder of a warrant issued for the construction of certain sewers, pursuant to section 469, Rev. Laws Okl., 1910, is entitled to interest thereon at the rate of 8 per cent. per annum from the date of the assessing ordinance up to the date of the payment of the assessment by the property owner, notwithstanding said assessment may not be paid until after the date of its maturity.—Supreme Court of Oklahoma, 146 P. R., 219.

**Changing Grade of Streets—Measure of Damage.**

Sherburne v. Inhabitants of Sanford.—Under Rev. St. c. 23, § 68, granting damages to a person injured when a street is raised or lowered by a road commissioner, the measure of damages is the diminution in market value of the property injured, and does not include damages for physical injuries that have occurred or may occur to the property in consequence of the raising, or resulting from insufficient catch-basins, or from not keeping them clean, or from surface water, or from failure to keep sewers in repair.—Supreme Judicial Court of Maine, 92 A. R., 997.

**Licenses—Occupations—Messenger Service.**

City of Portland v. Western Union Telegraph Co. et al.—A telegraph company engaging in the business of transmitting and receiving messages, which holds itself out to furnish in a city, for their customers, messengers for delivery of notes, packages, samples and advertising matter, and which maintains in various places in the city call boxes, by the use of which customers may secure messengers, and which fixes the compensation for the services, a part of which it retains and a part of which the messengers retain, is engaged in the messenger business within a city ordinance requiring a license fee for conducting the business and a bond conditioned on the faithful carrying on of the business.—Supreme Court of Oregon, 146 P. R., 148.

**Public Improvement—Streets—Assessment.**

Engelhard et al. v. Kentucky & Indiana Const. Co. et al.—Ky. St. § 2833, provides that, when the territory contiguous to any public way is not divided into squares by principal streets, the ordinance providing for improvement of the way shall state the depth not exceeding 500 feet on each side of the improvement which is to be assessed. Between a way two intersecting streets were improved, and the improvement ordinance provided that the assessment zone should extend on both sides of a point nearly 400 feet. One of the intersecting streets, instead of crossing at right angles, ran out in a diagonal line. Held, that the assessment district included all the land between the intersecting streets, and could not be closed by a line drawn at right angles at the point of the intersection of the way and the intersecting street which ran diagonally; hence petitioners, who owned land abutting on that street, should be assessed on all of their property, although, had the street been at right angles, a large portion would have escaped.—Court of Appeals of Kentucky, 173 S. W. R., 131.

**Violation of Ordinances—Buildings Within Fire Limits.**

City of Monticello v. Bates.—The rule that, where an ordinance prohibits the erection of wooden buildings within fire limits and provides a remedy for its violation by prosecution and the imposition of a fine, equity will not restrain the erection of a building, is founded on the theory that the penalty provided for in the ordinance furnishes a full, complete and adequate remedy; but, where the ordinance does not do so, equity will grant relief.—Court of Appeals of Kentucky, 173 S. W. L., 159.

**Contracts—Deposit—Recovery.**

Litchfield Construction Co. v. City of New York.—A contractor to construct sewers and relay the street pavements, which he was allowed to take up to do the work, could not recover the deposits made pursuant to the contract stipulating for deposits based on the measured area of the surface to be repaved at different rates based on different kinds of pavement, and to cover the cost of relaying the same, where he did not restore the pavements, but which was done by the bureau of highways of the city.—Supreme Court, Appellate Division, Second Department, 151 N. Y. S., 767.

**Sewers—Diversion of Flow of Surface Waters.**

Van Trump v. Kansas City.—Under Kansas City Charter 1889, art. 3, pars. 5, 6, giving the mayor and city council exclusive power and control by ordinance to regulate the use of sewers, and article 6, § 10, committing to the board of public works the duty of supervising the construction, alteration and repair of sewers and the issuing of permits for connecting with any sewer pipe, the park board had no authority to construct catch-basins connecting with a private sewer so as to carry surface water from the streets, and the city could not be held liable for damages to owners of property connected with such private sewer, thereby caused.—Kansas City Court of Appeals, Mo., 173 S. W. R., 32.

**Public Water Supply—Franchise.**

Town of St. Helena v. Ewer et al.—Under Const. art. 11, § 19, providing that in any city having no public works to supply water any individual or company shall have the privilege of using the streets for laying conduits as necessary to supply the city and its inhabitants with water for domestic and all other purposes, on condition that the city shall have the right to regulate the charges thereof, a franchise, granting the right to an individual who was the highest bidder to use the streets of a city for the distribution of water to its inhabitants on condition that he and his assigns pay to the city 7⅞ per cent. of the gross earnings arising therefrom, as authorized by St. 1897, p. 135, was unconstitutional in so far as it provided for such payment, and therefore unenforceable, though it also provided that it should not be construed as granting an exclusive franchise.—District Court of Appeal, Third District, California, 146 P. R., 191.

**Parks—Power of Boards—Unexpended Revenue.**

Mayor and City Council of Baltimore et al. v. Williams et al.—By ordinance of 1859 an association was given the right to lay tracks in Baltimore for passenger travel on paying one-fifth of the gross passenger revenue to the city, to be applied to the establishment of a city boundary avenue and for the location of parks. By subsequent resolution the mayor was given authority to appoint a park commission, while Acts 1861-62, c. 29, ratified the acts of the municipality. Later ordinances reduced the percentage to be paid by the use of the street; Acts 1882, c. 229, providing that the reduced tax should be paid the mayor and city council in the same manner as the old tax. The present city charter (section 6, subsec. 90) provides that all rights granted to the park commissioners shall be transferred to the board of park commissioners, while subsection 97 authorizes the park commissioners to expend the revenue, etc. Held, that the city generally had no right over park revenue, and the board of estimates could not treat unexpended revenue of one year as belonging to the current funds of the city for the next year.—Court of Appeals of Maryland, 92 A. R., 1066.

# NEWS OF THE SOCIETIES

### Calendar of Meetings.

March 22-26.
DOMINION GOOD ROADS ASSOCIATION AND ONTARIO GOOD ROADS ASSOCIATION.—Second Canadian and International Good Roads Convention, Convocation Hall, Toronto, Ontario, Canada. Secretary-Treasurer, George A. McNamee, 909 New Birks Bldg., Montreal, P. Q., Canada.
March 24-25.
FLORIDA STATE GOOD ROADS ASSOCIATION.—Annual Convention, St. Petersburg, Fla. Secretary, J. P. Clarkson, Jacksonville, Fla.
May 10-14, 1915.
AMERICAN WATERWORKS ASSOCIATION.—Annual Convention Cincinnati, O. Secretary, J. M. Diven, 47 State street, Troy, N. Y.
May 25-28.
INTERNATIONAL ASSOCIATION OF CHIEFS OF POLICE.—Cincinnati, O. F. J. Cassada, secretary-treasurer.
June 2-4.
SOUTHERN GAS ASSOCIATION.—Hotel Isle of Palms, Charleston, S. C.
June 14-16, 1915.
SOUTHWESTERN WATERWORKS ASSOCIATION.—Annual Convention, Galveston, Tex. Secretary, F. L. Fulkerson, Waco, Tex.
June 22.
MAYORS' ASSOCIATION OF CONNECTICUT.—Bridgeport, Conn.
Aug. 2-6.
GOOD ROADS CONGRESS.—San Francisco, Cal., under the auspices of the Tri-State Good Road Association.
Sept. 20-25, 1915.
INTERNATIONAL ENGINEERING CONGRESS.—Am. Soc. C. E., Am. Inst. Min. E., Am. Soc. Mech. E., Am. Inst. E. E. and Soc. N. A. & M. E., San Francisco, Cal. Secretary, W. A. Catell, Foxcroft Building, San Francisco, Cal.

### Michigan Good Roads Association.

The seventh annual convention of the Michigan Good Roads Association was held at the Coliseum, Grand Rapids (March 9 to 12). The Michigan Highway Department, the West Michigan Pike Association, the Grand Highway Association and several other local and state associations were represented at the meeting.

Among the addresses that were presented were the following:

"Kent County Roads," Alvah Brown, chairman Kent county road commission; "Roadside Planting and State Parks," Mrs. Henry Hulst, Grand Rapids, chairman committee on planting and parks, Michigan State Teachers' association. "The Trunk Line Roads," Dr. Ben H. Lee; "Looking Forward," J. Hackley Skinner, U. S. department of agriculture; "Michigan Roads," Frank F. Rogers; "County and Township Road Organization," W. W. Cox, Kalamazoo, district engineer; "Gravel Roads," L. H. Neilsen, district engineer; "Split Log Drag Road Maintenance," John J. Cox, Ann Arbor, instructor highway engineering, U. of M.; "Bridges, Culverts and Roads" (illustrated), L. C. Smith, Lansing, deputy state highway commissioner; "Rural Folks and Good Roads," Governor Ferris; "Road Construction From the Standpoint of the State Grange," John Ketchum, Hastings, master state grange; "The Evolution of Road Legislation," N. P. Hull; "Dustproof and Waterproof Trunk Line Roads," discussion opened by John W. Blodgett, Grand Rapids; "Road Bills Now Pending in Our State Legislature," Frank F. Rogers; "What the Federal Government Is Doing for Good Roads," M. O. Eldredge, Washington, chief bureau of roads department of agriculture; "Coming Through the Mud," Jesse Taylor, Jamestown, O., editor of Better Roads and Streets, president Ohio Good Roads federation; "Congress and Our National Highways," Senator Charles E. Townsend, Jackson; "The Use of Prison Labor on Our Highways," discussion opened by W. M. Bryant chairman, Kalamazoo county road commission; "Western Michigan Development Bureau," D. H. Day, president, Glen Haven, Mich.; "West Michigan Pike," L. H. Conger, secretary West Michigan Pike association, Muskegon; "Health First Along the Pike," Dr. William DeKleine, president West Michigan Pike association, Grand Haven; "Greetings From Illinois," W. C. Edens, president Associated Roads Organization of Chicago and Cook county; "National Aid Sentiment in Congress," J. C. McLaughlin, Muskegon, congressman, Twelfth district of Michigan; "Trunk or Local Highways," R. F. Sherwood, Watervliet, farmer and fruit grower, and R. F. Hoffman, Manistee, Manistee county good roads commission; "The Pike From a Business Man's Standpoint," J. D. A. Johnson; "Good Highways the Keynote of a Community's Prosperity," John I. Gibson; "Report of Tenth Annual American Road Congress at Atlanta," Charles W. Carmen, Grand Rapids, delegate; "Good Roads in the Northern Peninsula," Col. J. F. Mott; "Northeastern Development Bureau," T. F. Marston; "Cement Highways," William M. Connelly.

### Good Roads Congress.

Plans have been completed for the Congress of Good Roads which will be held in San Francisco during the week beginning August 2, and which will be represented by more than thirty leading good roads and highway bodies of the country. This will be the first good roads congress of its kind ever held on the Pacific coast, and will be called under the auspices of the Tri-State Good Roads Association, comprising California, Oregon and Washington.

Delegates from every leading good roads and highway association, the allied chambers of commerce of the Pacific coast, supervisors and many other officials will participate in the speaking program of the congress.

The purpose of the congress will be to bring a representative body of automobile and business interests together, where questions dealing with good roads and kindred subjects will be discussed. Matters of legislation, the question of securing Federal aid in constructing roads, the work of furthering lateral roads, bond issues and the subject of convict labor will be taken up in detail by the delegates.

Among the principal organizations invited to attend the congress are the following:

American Highways Association, National Highways Association, American Road Builders' Association, Automobile Club of Southern California, Pacific Highways Association, American Association of State Highway Officials, League of California Municipalities, League of Northwestern Municipalities, Board of Supervisors' Association of California, Lincoln Highway Association, American Bar Association and Cannon Ball Trails Association.

### Conference on Community Planning.

About one hundred persons attended the second annual conference on community planning for Essex County held at the court house in Salem March 2 and 3. A program in the various sections of farm improvement, education and community life was presented. Besides the informal conferences led by experts in the various sections there were two addresses, one by Dr. W. H. Coon, State inspector of health, on "Making a Public Health Program for a Town," and Dr. David Snedden, of the State Board of Education, on "An Adequate Educational Program." Col. W. D. Sohier, of the State Highway Commission, spoke on "Essex County Roads and Their Relation to Agriculture," and Professor W. D. Hurd, of the State Extension Service of the Massachusetts Agricultural College, spoke on "The Development of Our Agricultural Resources, State and County."

### Pennsylvania Housing and Town Planning Association.

The Pennsylvania Housing and Town Planning Association held its first meeting in the Fort Pitt Hotel on Thursday and Friday, March 11 and 12. Among the speakers at the various sessions and conferences, which were open to the public, were Dr. Carol Aronovici, of Philadelphia, Pa.; Miss Mabel Chadsey, who is superintendent of sanitation in Cleveland, O.; A. B. Farquhar, of York, Pa., president of the State association; Congressman Warren Worth Bailey, of Johnstown, Pa., and others.

As good housing is one of the subjects which is taken up by the State Federation of Pennsylvania Women at almost all of its meetings, the Pittsburgh club women took an active interest in the program. The Congress of Women's Clubs of Western Pennsylvania gave a luncheon in the Fort Pitt Hotel at 12:30 o'clock on Friday to the delegates and visitors. The special guests of honor were Miss Chadsey, who spoke on "Municipal Housekeeping"; Dr. Aronovici, Congressman Bailey, Mr. Farquhar, Albert Kelsey, of Philadelphia.

The convention opened at noon Thursday, when the Civic Club of Allegheny County and the Association of Credit Men gave a joint luncheon at 12:15 o'clock, at which Dr. Aronovici and Miss Chadsey were the speakers, the former discussing "Business Aspects of Constructive Housing Reform"

and the latter "Sanitary Aspects of Housing."

The first formal session was on Thursday afternoon at 2:30 o'clock, the Rev. Charles E. Snyder presiding. Dr. J. Leonard Levy spoke on "Garden Cities of England"; Mr. Kelsey, "City Planning for Third-Class Cities," and D. W. Harper, Erie, Pa., "Practical Building of Small Homes."

Thursday evening's session was devoted to transportation and the homes of industrial workers, Mr. Farquhar presiding. Congressman Bailey spoke on "Taxation and Transportation; Their Relation to Housing." "The Housing of Workers in Industrial Plans" was discussed by representatives of the Carnegie Steel Company and the American Bridge Company, and "Organization for Housing of Industrial Employees" by M. R. Scharf, sanitary engineer, Pittsburgh.

A business meeting was held Friday morning at 10 o'clock, followed at 11 by a report of the conference committee on town planning, presented by Dr. Aronovici.

Mrs. Franklin P. Iams, legislative chairman for both the General Federation of Women's Clubs and the State Federation of Pennsylvania Women, presided at the afternoon session at 2:30 o'clock. "The State Association; What Is It Going to Do?" with relation to legislation, was presented by Bernard J. Newman; Mr. Snyder and Miss Chadsey discussed "Law Enforcement," and Dr. J. F. Edwards, director of the Pittsburgh department of health, spoke on "Public Education in Constructive Housing."

The Housing Conference of Pittsburgh, which was the host of the State association, is composed of representatives from the following local organizations: The Department of Health, Pittsburgh; Civic Club of Allegheny County, Irene Kaufmann Settlement, Christian Social Service Union, Associated Charities, Chamber of Commerce, Pittsburgh Board of Trade, Kingsley House, Association for Improvement of the Poor, Juvenile Court Association, Central Y. M. C. A., Pittsburgh Real Estate Board, Public Charities Association of Pennsylvania, Social Service Committee of First Unitarian Church and the United Hebrew Relief Association.

The officers of the Pennsylvania Housing and Town Planning Association are: President, A. B. Farquhar, York; vice-president, D. W. Harper, Erie; treasurer, William Jennings, Harrisburg; secretary, Sherrard Ewing, Reading.

### Freeholders of New Jersey.

An organization consisting of the freeholders of the different counties was formed at a meeting of the State County Engineers' Association in Trenton Feb. 24. Officers were elected and a committee appointed to draw up a set of by-laws for adoption. Freeholder Anthony J. Gebhardt, of Middlesex county, was elected treasurer of the new organization, which will work in conjunction with the county engineers.

The convention went on record as advocating the reorganization of the State Road Department with a three-head commission and to recommend that Colonel Edwin A. Stevens, the present road commissioner, should be one of the new commissioners. Those present went on record as favoring home rule in road affairs.

The following officers were elected: Joseph R. Thatcher, of Warren county, president; C. A. Smith, Union county, vice-president; Frank W. Folkes, of Cape May, secretary, and A. J. Gebhardt, of Middlesex, treasurer.

### Illuminating Engineering Society and American Institute of Electrical Engineers.

A joint meeting of the Pittsburgh sections of the Illuminating Engineering Society and the American Institute of Electrical Engineers was held March 9. Papers were presented by Dr. R. E. Meyer, of the Westinghouse Lamp Company, Bloomfield, N. J., on "The Manufacture of New Types of Mazda Lamps," and by Prof. H. S. Hower, of the Carnegie Institute of Technology, on "The Use of Projection Lenses in Signal Work." Both were illustrated by lantern slides, and there was, in addition, a large exhibit of different types of lamps, mirrors and lenses.

### County Road Supervision.

The annual meeting of the Cambria County Road Supervisors will be held March 23 at Ebensburg, Pa. Addresses will be made by O. P. Thomas, D. P. Weimer and Earl Sorber. Harry Somersville is president and J. F. Boyer is secretary of the organization.

### Iowa State Drainage Association.

Following a two days' session, Feb. 26 and 27, the Iowa State Drainage association adjourned. The officers elected were: President, H. M. Sparboe, Webster City; vice-president, J. W. Boyer, Fort Dodge; secretary, M. F. P. Costello, Ames. The association went on record as favoring taking the management of drainage districts out of the hands of boards of supervisors and vesting it in three drainage commissioners in each district. It also passed a resolution favoring the bill now before the Iowa legislature to prevent sewers from discharging into lakes, rivers or ponds.

## PERSONALS

Caulfield, Albert J., captain of the Boston, Mass., fire department, has been appointed provisional chief of the Salem fire department, succeeding William O. Arnold, retired.

Cowan, Clinton, former Hamilton County engineer, has been appointed State Highway Engineer of Ohio, succeeding James P. Marker, resigned.

Porter, R. P., has resigned as Mayor of Las Cruces, N. M.

Miller, F. O., has been re-elected chairman of the good roads committee of the Jacksonville, Fla., Board of Trade.

Walsh, James P., chief of the Saginaw, Mich., police force, died from heart disease March 11.

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The following officers have been elected:

Dayton, Me.—J. Burton Roberts, town clerk; Hugh Steele, treasurer; C. E. Smith, auditor; L. L. Clark, fire warden.

North Andover, Mass.—James H. Goff, chief of police.

Laurel, Del.—S. D. Marvil, mayor; T. E. Elliott, Charles Gunby, C. C. Ellis, Chas. Oliphant and Frank Gordy, councilmen.

(Continued on page 375.)

## BOOK REVIEW

POLICE PRACTICE AND PROCEDURE.—By Cornelius F. Cahalane. With an introduction by Arthur H. Woods, Police Commissioner of New York. E. P. Dutton & Co., New York. 241 pp. (illustrated). $1.50 net.

Inspector Cahalane, who is in charge of the training school of the New York police department, has been through all the ranks of the force, and he knows policemen, their difficulties, their mistakes and the varied knowledge of laws, duties, powers and the ways of criminals which they must have. This book is really a detailed instruction manual of practice and procedure for patrolmen and their higher officers. All the incidents, accidents, crimes and various unclassifiable troubles that come in the day's work of the policeman are treated simply and with sensible, explicit instructions for their handling. The first chapter takes up "Discipline and Deportment," and the second "Physical Condition." "Patrol" covers general considerations, the use of fire-arms, observation, fires, accidents and first aid to the injured. Powers of arrest and treatment of prisoners, especially children, demented persons and fugitives, are then discussed. A chapter on evidence, court procedure and disposition of property follows. "Criminal Identification and Finger Prints" are graphically explained. "Traffic and Street Conditions" are dealt with in another chapter. Crimes and the ordinances relating to them and the methods of criminals are given in detail and the methods of handling cases explained. "Investigations and Reports" is a very helpful chapter and gives sample reports. The final chapter shows the range of police duties and describes the many ways in which a policeman can and should co-operate with the departments of the city government. Police Commissioner Woods of New York thought so well of the book that it has been distributed to all members of his force—it should prove just as valuable to all in, or interested in, police work anywhere.

# NEW APPLIANCES

## COST AND TIME DATA
### On Tamping Machine Operation.

A Pawling & Harnischfeger power traction tamper was used by C. W. Wilson in a large conduit installation in Superior, Wis. The soil here is a tough red clay and the board of public works insisted that all the excavated material be removed and the trench refilled with sand. Mr. Wilson, however, demonstrated the efficiency of the tamper and was allowed to back-fill with clay. Mr. Wilson says that by this he saved more than the price of the machine in sand alone. In the costs kept of the job it was found that the tamper reduced the expenses about 6 cents per lineal foot on back-filling. It was found the tamper also cut asphalt at the approximate rate of 50 feet per hour, both sides of the trench. Mr. Wilson also states that the tamper will easily take the place of eight men in removing concrete.

On a job in Milwaukee, Wis., the tamper was used as a concrete smasher and asphalt cutter by the Wisconsin Telephone Co. in excavating for a conduit. The concrete used was 6 inches thick and the asphalt covering with the binder averaged 2 inches in thickness. Time records were kept comparing the work of men and machines, several observations being made at different times on different men. The time used was that during which the pick was actually wielded, no allowance being made for resting, pauses or delays. The figures, therefore, do not indicate the time actually taken by a man to do a given amount of work. In the case of the machine the delays are computed to average about 10 per cent. of the digging time and in the case of the men about 30 per cent. In cutting asphalt the machine removed 16 square yards per hour.

**Breaking Concrete with Machine (1 Man Required).**

| Observations. | No. of Sq. Ft. Removed. | No. of Cu. Ft. Removed. | Time Taken to Remove, Min. | Rate of Machine Sq. Ft., Min. | Rate per Man Sq. Ft., Min. |
|---|---|---|---|---|---|
| 1 | 90 | 45 | 100 | .9 | .45 |
| 2 | 75 | 37.5 | 90 | .83 | .425 |
| 3 | 94.5 | 47.25 | 100 | .945 | .472 |
| 4 | 55 | 27.5 | 57 | .96 | .48 |
| 5 | 37.5 | 18.5 | 41 | .92 | .46 |
| 6 | 20 | 10 | 22 | .91 | .455 |
| Ave. | 372.0 | .. | 410 | .91 | .455 |

**Breaking Out Concrete with Pick (1 Man).**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 5.5 | .. | 15 | .. | .366 |
| 2 | 4 | .. | 11 | .. | .363 |
| 3 | 8 | .. | 25 | .. | .320 |
| 4 | 6 | .. | 20 | .. | .3 |
| Ave. | 23.5 | .. | 71 | .. | .33 |

**Cutting Asphalt with Machine (2 Men).**

| Observations. | No. of Ft. of groove cut. | Total Time Taken, Min. | Rate of Machine Ft. 1 hr | Rate of Man Ft. per hr. | Equiv. Rate Sq. Yds. Asphalt Removed, 36" ditch per man per hr. |
|---|---|---|---|---|---|
| 1 | 64 | 26.5 | 145 | 72.5 | 8 |

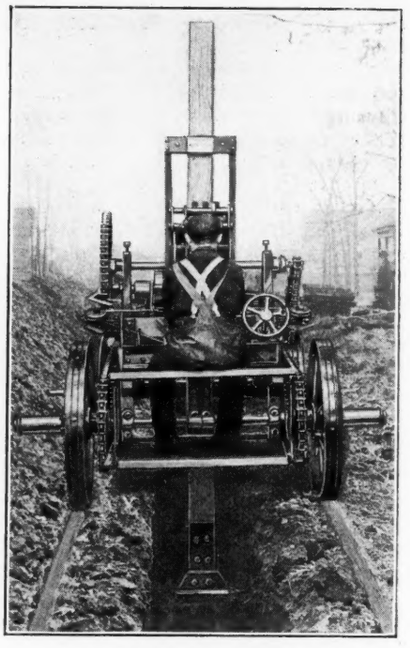
**Cutting Asphalt by Hand.**

| | | | | | |
|---|---|---|---|---|---|
| 1 | 6 | 20 | 18 | 18 | 2 |
| 2 | 5 | 15 | 20 | 20 | 2.22 |

This tamper, which was fully described and illustrated in these pages in Municipal Journal of July 2, 1914, is made by the Pawling & Harnischfeger Co., Milwaukee, Wis.

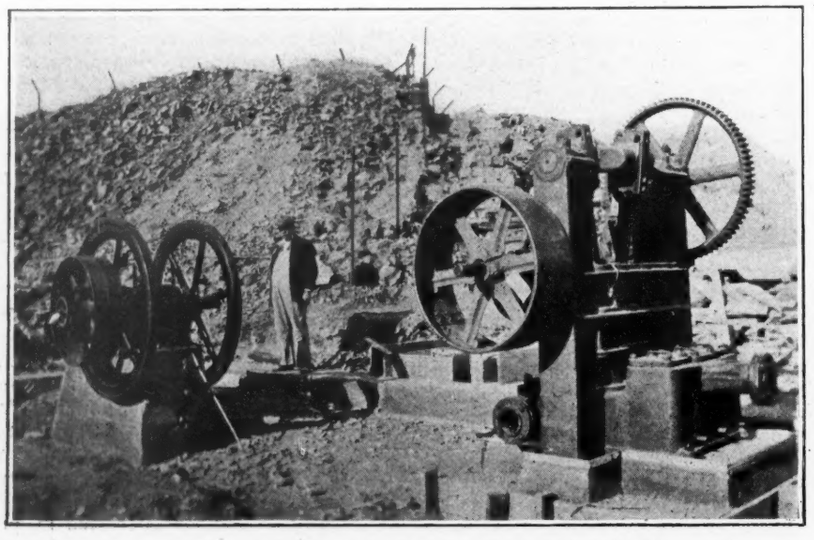
## BOOSTER PUMPING PLANT.
### Goulds Installation at El Paso, Tex.

The El Paso booster pumping plant was installed for the purpose of furnishing water to the northern section of El Paso, which is located on the high tablelands at the foot of and west of Mount Franklin. The plant is located at the edge of the mesa and near the old city storage reservoir, and the water is drawn from this. The pump is a 7x8 Goulds single-acting, triplex plunger pump made by the Goulds Mfg. Co., Seneca Falls, N. Y. The water is forced through a pipe line 1½ miles to a reservoir at the foot of Mount Franklin, from which the water will be distributed over the entire northern residence portion of the city. The pump is being erected by Don A. Carpenter & Co., El Paso.



POWER TRACTION TAMPER.

The pump is guaranteed to deliver 225 gallons per minute when under a lift of 260 feet. It is driven by a 25-h. p. gasoline engine with a reheater attachment for burning low-grade fuels. The starting equipment consists of a small Novo gasoline engine belted to a Goulds compressor, which provides enough air to start the engine. The plant in its entirety represents one of the most complete stations in the Southwest and has attracted much favorable attention.



BOOSTER PUMPING PLANT AT EL PASO, TEX.

# INDUSTRIAL NEWS

**Cast-Iron Pipe.**—Chicago.—Awards of 2,500 tons of pipe in Akron, O., and 1,200 tons at Duluth are to be made. At Fort Wayne, Ind., the leading interest took 300 tons. New business in view amounts to over 2,500 tons and includes 900 tons for St. Louis, 600 tons for Holton, Kan.; 300 tons for Burton, Kan.; 400 tons for Orion, Mich., and 250 tons for Iowa City, Ia. Quotations: 4 inch, $25.50; 6 to 12 inch, $23.50; 16 inch and up, $23. Birmingham—Water and gas pipe manu-

facturers are operating on a large scale and orders are good. Quotations: 4 inch, $20; 6 inch and up, $18. New York—Contracts for pipe-laying involving about 1,100 tons of cast-iron pipe for the boroughs of Queens and the Bronx have been let by the city of New York. It is understood that the successful bidders for a considerable part of the work have arranged to purchase the pipe required by them from the Standard Cast Iron Pipe & Foundry Co. The fire department of the city has opened bids for about 200 tons of flexible joint pipe. Quotations: 6 inch, $20 to $20.50.

**Lead.**—Quotations: New York, $3.95; St. Louis, $3.875.

**The General Electric Co.'s** Sprague Electric Works has recently opened a branch sales office in Cleveland, O., in the Illuminating Bldg. It will be in charge of Frank H. Hill, manager, who also has charge of the Pittsburgh office.

**The Troy Wagon Works Co.,** Troy, O., is constructing a new plant for manufacturing auto truck trailers. The building will occupy 16,800 sq. ft. and will have a capacity of over 60 trailers per week. The trailers will be made in 1½, 2½ and 5-ton sizes.

**The International Gas Engine Co.,** subsidiary of the Power, Mining and Machinery Co., announces that W. H. Day, sales manager of the former, has assumed supervision of the business of the International concrete mixer. Mr. Day has been head of the International Gas Engine Co. for many years.

## PERSONALS

(Continued from page 373.)

Mannington, W. Va.—J. D. Charleton, mayor; A. W. Piper, recorder; S. P. Hawkins, collector; G. L. Watts, chief of police; councilmen, H. V. Buprt, B. F. Huey, H. R. Furbee; auditors, C. C. Coffman, E. M. Yost, Charles Drake.

Salem, N. H.—Town clerk, Daniel A. Abbott; town treasurer, James Ewins; water commissioner for three years, Ambrose N. Turner; highway agents, New Buxton, Stanwood S. Stewart, Fred K. Duston.

Cooperstown, N. Y.—Allen Gallup, mayor; James F. Whipple, clerk and treasurer.

Rockland, Mass.—James A. Cody, Bartholomew J. Fitzgerald, Mark W. Murrill, selectmen; E. R. Studley, town clerk; J. S. Gray, treasurer; George W. Wood, assessor; John H. Burke, water commissioner; Henry A. Baker, highway surveyor; Wm. H. Bowler, board of health.

Peabody, Mass.—P. H. Coleman, P. J. Murphy, P. J. Sheehy, C. A. Giles, H. H. Buxton, selectmen; E. M. Poor, town clerk and treasurer; J. J. Costello, auditor; C. H. Cotter, municipal light board; C. T. Quint, park commission; E. A. Blaney, public works commission.

Muscatine, Ia.—H. B. Caple, city recorder; C. H. Young, city engineer; E. T. Allen, street commissioner.

Augusta, Me.—Blaine S. Viles, mayor; aldermen, Arthur N. Soule, Wilbert S. Wilson, Royal H. Bodwell, Aime Casavant, Percy W. Morrill, Walter M. Sanborn, Herbert C. Brown, Elbridge G. Perham, Jr.; councilmen, Oscar H. Anderson, William B. Williamson, G. Cony Weston, John Dixon, Henry O. Parmenter, Danforth L. Nash, Alfred J. Lacasse, Paul Lausier, Charles B. Philbrick, Charles R. Dutton, Albert G. Hopkins, Hazen Beecher, A. B. Marr, John E. Hanson, Charles E. Fletcher and Harold R. Doe.

Bradley Beach, N. J.—William E. MacDonald, Bernard V. Poland and Albert T. Rogers, commissioners.

Ilion, N. Y.—Police, Messrs. Doty, Hamlin and Davies; fire, Davies, Hamlin and Jones; finance, Hamlin, Doty, Jones; clerk of the board of health, W. T. Jones. The following appointments were made: Fred Joerissen was reappointed water commissioner; V. C. Lewis was appointed on sewer board to fill vacancy caused by the resignation of W. T. Jones; C. L. Northway was appointed on sewer board to succeed L. L. Caswell, whose term expires.

Edgewood, W. Va.—John M. Ritter, mayor.

Belfast, Me.—Charles R. Coombs, mayor.

Biddeford, Me.—James G. C. Smith, re-elected mayor.

Eau Claire, Mich.—R. F. Moore, president; C. N. Brant, clerk; W. G. Sharpe, treasurer.

Marcellus, Mich.—Dr. C. E. Davis, president; Francis Beadle, clerk; Oscar Romeg, treasurer.

Vandalia, Mich.—L. L. Lasenberg, president; Carl Fritz, clerk; Frank Kollar, treasurer.

Edwardsburg, Mich.—Dr. E. W. Tonkin, president; Walter Tuesley, clerk; Le Roy Darr, assessor.

Cassopolis, Mich.—Dr. W. C. McCutcheon, president; Eber Reynolds, clerk; Edgar French, treasurer.

Waterville, Me.—J. A. Lateman, city clerk; E. D. Estey, street commissioner; Eugene Crawford, city engineer. Committees: Fire department, Austin, Spaulding, Sturtevant, Lewis, Butler, Simpson, Poulin; new streets, Cowan, Pulsifer, Goodhue, Stewart, Poulin; street lights, Cowan, Sturtevant, Tracy, Rose, Roderick; new sidewalks, Sturtevant, Spaulding, Goodhue, Dyer, Baldic; parks, Pulsifer, Lambert, Rose, Dyer, Page; public buildings, Pulsifer, Cowan, Simpson, Tracy, Baldic; streets and sewers, Pulsifer, Cowan, Spaulding, Goodhue, Baldic, Lewis, Poulin; police, Mayor Bartlett, Spaulding, Pulsifer, Austin, Cowan, Sturtevant; sanitary, Sturtevant, Cowan, Lambert; sprinkling, Pulsifer, Sturtevant, Darviau, Cowan, Spaulding.

The following officials have been elected in Minnesota:

Hibbing—Victor Power, president; B. J. Burrows, John Curran and Rupert Swinnerton, trustees; D. D. Haley, recorder; L. L. Geiselman, treasurer.

Biwabik—F. S. Colvin, president; I. R. Gilpatrick, clerk; O. E. Everett, D. W. Owens and Peter O'Donnell, trustees.

Nashwauk—H. G. Reisel, village president; W. M. Ohles, clerk; Prockeet Brown, treasurer.

Keewatin—Philip N. Stone, president; Charles Extrum, clerk; William Steenstrupp, treasurer.

McKinley—J. Ahlin, mayor; Anton Skoda, Hjalmar Berger and John Peterson, trustees.

Mountain Iron—A. W. Saari, president; C. A. Webb, clerk; Angelo Derito, treasurer.

Buhl—George R. Barrett, president; Axel Kilstrom, recorder; William Reulunde, treasurer.

Kinney—John Rabourn, mayor; John McGraw, treasurer.

Chisholm—Henry Frugere, president; C. E. French, treasurer.

Calumet—J. F. Robinson, president; J. J. Ardahl, clerk; C. J. Kienan, treasurer.

Aurora—August F. Tillmans, president; A. E. Hill, recorder; C. F. Luth, treasurer.

Gilbert—Dr. Fred Barrett, president; T. H. Sharp, clerk; W. J. Luke, treasurer.

Grand Rapids—George Riddell, president; F. A. McVicar, recorder; Lester Lofberg, treasurer.

Coleraine—H. C. Downing, president; Dr. C. L. May, U. Tribilcock and Gust Baum, trustees; J. A. Wassen, recorder.

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Framingham, Mass.—C. O. F. Rice, 3 years; W. F. Walsh, 2 years, and Peter McFee 1 year, selectmen.

Barre, Vt.—The following committees have been appointed: Finance, Cook, Keast, Glysson; fire, Glysson, Keast, Cook; health Cook, Bruce, Glysson; lights Shurtleff, Bruce, Rossi; police, Glysson, Keast, Cook; streets, Keast, Rossi, Glysson; supplies, Glysson, Bruce, Rossi, salaries, Keast, Glysson, Shurtleff; water, Cook, Glysson, Rossi.

Milford, Mass.—Alfred F. Martin, sewer commissioner; Dennis J. Sullivan, town clerk; John E. Swift, town treasurer; William S. Staples, park commissioner.

Addison, Vt.—Moderator, M. F Barnes; clerk, L. C. Seegar; treasurer L. C. Seegar, selectmen, Robert Moore, E. C. Torrey W. W. Clark; road commissioners, F. L. Willmarth, A. L. Patten; town agent, S. E. Smith.

North Andover, Mass.—Joseph A. Duncan, town clerk; George H. Perkins, town treasurer; John T. Campbell, E. E. Curley and Peter Holt, selectmen; W. H. Poor, highway surveyor; James W. Elliott, auditor; John F. Bauman, water commissioner; Dr. E. W. A. Holt, member board of health.

Andover, Mass.—Alfred Ripley, moderator; George A. Higgins, town clerk and treasurer; Charles Bowman, selectman; William B. Hodgkins and Andrew McFernan, board of public works and sinking fund commissioners.

Burlington, Vt.—Albert S. Drew, mayor; C. L. Woodbury, Eugene A.

Luck, George H. Lessor, Frank J. Dwyer, Arthur G. Mausur and Addison Buell, aldermen.

Amesbury, Mass.—J. William Gale, Frederick W. Howes, William V. Barker, selectmen; Nathan E. Collins, town clerk; John J. Allen, treasurer; Geo. C. Dearborn, assessor; Geo. Allen, tax collector; George W. Bryant, water commissioner; Warren E. Fuller, park commissioner; Samuel L. Porter, Joseph O'Donnell, board of health; Daniel C. Dame, George W. England, sewer commissioners.

Barre, Vt.—Mayor, Frank E. Langley; city clerk, James Mackay; city treasurer, James Mackay; assessor for three years, Martin Riley; auditors, J. A. Healy, W. B. Marrion and D. J. Sullivan; alderman in first ward, Eugene C. Glysson; alderman in third ward, O. D. Shurtleff; alderman in fifth ward, Antonio Rossi.

Ipswich, Mass.—John A. Brown and Aaron Wells, selectmen for three years; Chester Bamford, treasurer and collector; Arthur W. Walton, auditor; George A. Schofield, water and light commissioner; George E. MacArthur, board of health; James A. Morey and Charles Wells, park commissioners.

North Attleboro, Mass. — Devlin, Rose, Coombs, Clifford, selectmen; James G. Cheever, town clerk; Frank T. Westcott, town treasurer; Reynolds, assessor; Freeman, electric light, water and sinking fund commissioner; Dr. E. S. Ward, board of health; McAlpine, park commissioner; McGivney, sewer commissioner.

Hallowell, Me.—Samuel G. Otis, mayor; Albert L. Longfellow, street commissioner.

Auburn, Me.—Henry R. Porter, mayor.

Lewiston, Me.—Louis J. Brann, mayor.

Saco, Me.—James H. Fenderson, mayor.

Ellsworth, Me.—Dr. Alexander C. Hagerthy, mayor (re-elected).

Waterville, Me.—Martin F. Bartlett, mayor.

Eastport, Me.—Edgar M. Cherry, mayor.

Bath, Me.—John A. Small, mayor.

Rockland, Me.—Charles M. Harrington, mayor.

Middlebury, Vt. — Selectmen three years, E. E. Ross; Hartwell Danyeau, re-elected road commissioner; Charles E. Pinney, trustee of public money and town treasurer; Judge James B. Donoway, town agent.

South Portland, Me.—Charles E. West, mayor; C. B. McIntyre, F. E. Anderson, Edmund W. Conary, Harold F. Higgins, A. T. Brackett, F. W. Bryant and F. H. Gilman, aldermen.

Pownall, Mass.—Moderator, Fred C. Brown; clerk, M. F. Lampman; treasurer, M. F. Lampman; selectman, three years, E. E. Potter; road commissioner, E. H. Hayes; tax collector, F. A. Wilson; auditors, Fred C. Brown, Charles H. Myers; trustee public money, J. W. Gardner.

Bemidji, Minn.—President of Council, Frank B. Lyman; City Attorney, P. J. Russell; City Engineer and Street Commissioner, Thomas W. Swinson; City Water Clerk, George Kirk.

Moundsville, W. Va.—Mayor, Evan E. Roberts; City Solicitor, Everett F. Moore; Chief of Police, Rex Rader.

Mechanicville, N. Y.—Village President, Homer Eckerson; Trustees, Jerome Horton, Eli H. Leighton, George Vredenburg.

## U. S. Civil Service Examination.

### Landscape Architectural Draftsman (Male). April 7, 1915.

The United States Civil Service Commission announces an open competitive examination for landscape architectural draftsman, for men only, on April 7, 1915, to fill a vacancy in this position at $90 a month in the Engineers' Department at Large, War Department, Washington, D. C., and vacancies as they may occur in positions requiring similar qualifications, unless it is found to be in the interest of the service to fill any vacancy by reinstatement, transfer, or promotion.

Competitors will be examined in the following subjects, which will have the relative weights indicated:

| Subjects. | Weights. |
|---|---|
| 1. Practical questions in landscape architecture, etc. | 60 |
| 2. Training and experience | 40 |
| Total | 100 |

Applicants must have had a university training in landscape design and landscape drafting, and possess some familiarity with civil engineering and horticultural subjects. In addition, not less than six months' experience in the office of a landscape architect is a prerequisite for consideration for this position. Higher ratings will be given for additional experience in architectural, nursery, or park department work. The duties of this position will consist almost entirely of drafting-room work. Age, 18 years or over on the date of the examination. This examination is open to all men who are citizens of the United States and who meet the requirements.

Persons who meet the requirements and desire this examination should at once apply for Form 1312, stating the title of the examination for which the form is desired, to the United States Civil Service Commission, Washington, D. C.

## New York State Civil Service Commission.

Civil Service Examinations — State, County and Village Service.
April 3, 1915.

Open competitive examinations for the State, county and village service will be held in various cities throughout the State April 3, 1915, for the positions mentioned below. These examinations cover positions in the classified service, in the State Departments and Institutions, the various classified county departments and institutions and the villages so far as they are classified. Appointments to positions in the county and village service will be made when practicable from the general eligible lists, residents of the county or village being preferred for such appointments. Intending competitors must execute application blanks and file them in the office of the Commissioner on or before March 26, 1915.

82. Junior Assistant (Rodman), Engineering Departments. $901 to $1,200. Minimum age, 20 years. Subjects of examination and relative weights: Problems in applied mechanics and mathematics, including surveying, elementary structures and hydraulics; questions on surveying and construction practice, and on materials of construction, 3; experience, education and personal qualifications, 2. Open to non-residents.

84. Examiner, State Civil Service Commission. $1,800. Open to men only. One appointment is expected. The duties of this position will consist of clerical and examining work, field work, correspondence, holding examinations, rating papers, and work of a similar character. Candidates must be graduates of a high school or have an equivalent education, according to the standards of the New York State Education Department, and additional credit will be given for college, university or professional education. Candidates are preferred who are not less than twenty-five or more than forty years of age, and they must have had not less than three years' actual experience in the work of a Civil Service Commission, or in work of a similar character satisfactory to the Civil Service Commission of New York State. Applicants will not be required to appear for a written examination but they will submit applications on the prescribed blanks which should contain full statements of their experience. Rating will be made on education, experience, and personal qualifications, and special credit will be given for actual experience in the work of a Civil Service Commission; they may also be summoned for personal interview with the examiners. Examination open to non-residents without restriction of the usual rule giving preference in certification to residents of New York State.

89. Inspector of Construction, State Department of Highways. Counties of Dutchess, Nassau, Orange, Putnam and Ulster. Salary, $3.50 to $4.50 per day. Applicants must be in good physical condition, able-bodied and fit for out-door duties involving exposure, and must have had practical experience in the building of roads, or of other public or private works, either in construction or maintenance. Subjects of examination and relative weights: Practical questions on the construction of roads under the various methods employed, including the preparation and placing of concrete, inspection of materials and work, 1; experience and personal qualifications, 1. The Highway Law requires that "Inspectors of Construction * * * shall be residents of the county within which the highway constructed or improved is located." Examination open only to residents of the counties mentioned above.

For application blank, address State Civil Service Commission, Albany, N. Y

# ADVANCE CONTRACT NEWS

**ADVANCED INFORMATION BIDS ASKED FOR**

**CONTRACTS AWARDED ITEMIZED PRICES**

**To be of value this matter must be printed in the number immediately following its receipt, which makes it impossible for us to verify it all. Our sources of information are believed to be reliable, but we cannot guarantee the correctness of all items. Parties in charge of proposed work are requested to send us information concerning it as early as possible; also correction of any errors discovered.**

## BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---|---|---|---|---|
| | | | **STREETS AND ROADS.** | |
| Ind., | Indianapolis | 10 a.m., Mar. 20 | 200,000 gals. road oil; 200 carloads crushed stone; road graders and drags | Comrs. Marion Co. |
| La., | New Orleans | Noon, Mar. 20 | 20 miles of highway | W. E. Atkinson, State Hwy. Engr. |
| Wis., | Racine | 10 a. m., Mar. 20 | Sprinkling 35 streets during the summer | Board Public Works. |
| Va., | Pulaski | Mar. 20 | Seven miles macadam and concrete streets | M. S. Hudgins, City Engr. |
| W. Va., | Huntington | Mar. 22 | Vit. brick paving | City Comrs. |
| Va., | Lawrenceville | Mar. 22 | 70 miles dirt road | County Clerk. |
| N. J., | New Brunswick | 8 p.m., Mar. 22 | Regulating and grading streets | Street Comr. |
| Conn., | Hartford | 2 p.m., Mar. 22 | State highway construction | C. J. Bennett, St. Hwy. Comr. |
| N. Y., | Rochester | Noon, Mar. 22 | Road improvement | J. Y. McClintock, Supt. Hwys. |
| Mass., | Boston | Noon, Mar. 22 | Bituminous macadam and wood block pavement | L. K. Rourke, Comr. Pub. Wks. |
| Minn., | St. Paul | 10 a.m., Mar. 22 | 110,000 lbs. paving cement and 977 tons road asphalt; grading and improving streets | Aug. Hohenstein, Pur. Agt. |
| Ind., | Broad Ripple | 7.30 p. m., Mar. 22 | Constructing concrete sidewalk | Board of Trustees. |
| N. J., | Milburn | 8 p.m., Mar. 22 | Concrete curb | Milburn Twp. Committee. |
| Ia., | Marshalltown | 9 a.m., Mar. 22 | Street improvements | W. E. Nicholson, Comr. P. S. |
| Ill., | Galesburg | 9 a.m., Mar. 22 | Grading, curbing and paving streets, 5,815 yds. brick paving | Board of Local Improvements. |
| N. J., | Glenridge | 8 p.m., Mar. 22 | 30,000 gals. non-asphaltic road oil | John Brown, Borough Clk. |
| Wis., | Oshkosh | 2 p.m., Mar. 22 | One road grader and one scarifier | R. A. Hollister, Chr. B. P. W. |
| Minn., | International Falls, | 10 a.m., Mar. 23 | Corrugated iron or steel culverts | L. H. Slocum, Co. Aud. |
| Wis., | Crookston | 10 a.m., Mar. 23 | Road improvements | H. J. Welte, Auditor. |
| Conn., | Meriden | Mar. 23 | Paving with wood block and vit. brick | W. S. Clark, Supt. P. W. |
| N. C., | Kinston | Mar. 23 | 12,000 yds. paving; 20,000 yds. sidewalk and 30,000 ft. concrete curb and gutter | D. C. White, Engr., Charlotte. |
| Minn., | Winona | 2 p.m., Mar. 23 | Constructing state rural highways | C. W. Anding, Co. Aud. |
| N. Y., | Albany | 1 p.m., Mar. 23 | State highway construction | Edwin Duffy, Comr. |
| Tex., | Terrell | 4 p.m., Mar. 23 | Street paving | Jule Trueheart, City Secy. |
| Md., | Rockville | Mar. 23 | 3.52 miles state aid highway | County Comrs. |
| N. Y., | L. I. City | 11 a.m., Mar. 24 | Regulating and grading streets | President Boro. of Queens. |
| N. Y., | Brooklyn | 11 a.m., Mar 24 | Regulating, grading and paving | L. H. Pounds, Boro. Pres. |
| Mass., | Boston | Noon, Mar. 24 | Bituminous macadam paving | L. K. Rourke, Comr. Pub. Wks. |
| Miss., | Columbus | Mar. 24 | 22 miles macadam road construction | G. E. Hauser, Jr., Co. Engr. |
| W. Va., | Charleston | 10 a.m., Mar. 24 | 71,640 yds. paving and 40,700 ft. of curbing | O. A. Petty, Pres. Bd. Affairs. |
| S. D., | Vermilion | 10 a.m., Mar. 24 | One or two heavy road graders | J. T. Olson, Co. Aud. |
| N. J., | Irvington | 8 p.m., Mar. 24 | 60,000 gal. non-asphaltic road oil | I. J. Casey, Jr., Twn. Engr. |
| N. Y., | New York | 3 p.m., Mar. 25 | Asphaltic concrete road surfacing | Park Board. |
| Ind., | New Albany | 8 p.m., Mar. 25 | Making and repairing sidewalks | Board Public Works. |
| Fla., | Jacksonville | Mar. 25 | Paving streets | Duval County Comrs. |
| N. J., | Basking Ridge | Mar. 25 | Rebuilding road. | Somerset Co. Bd. Freeholders. |
| Ala., | Lafayette | Mar. 25 | Grading and draining 5 miles of road | County Comrs. |
| N. Y., | New York | 2 p.m., Mar. 25 | Granite paving blocks | F. J. H. Kracke, Com. Bridges. |
| O., | Springfield | Noon, Mar. 26 | Grading, curbing and paving streets | C. E. Ashburner, City Mgr. |
| Mich., | Hillsdale | 7 p.m., Mar. 26 | 7,500 yds. paving | City Clerk. |
| Wis., | Richland Center | 4 p.m., Mar. 26 | 18,570 yds. paving; 12,000 yds. grading and 4,400 ft. curb | E. J. Lunenschloss, City Engr. |
| Minn., | Duluth | 10 a.m., Mar. 26 | Street improvements; two street flushers | Board Public Works. |
| Ill., | Highland | 2 p.m., Mar. 27 | 5,800 ft. one-course concrete road | Comrs. of Highways. |
| Ind., | Terre Haute | 11 a.m., Mar. 27 | Constructing two gravel roads | N. G. Wallace, Co. Aud. |
| Ill., | Highland | 2 p.m., Mar. 27 | 5,800 ft. cement road | Louis Lory, Town Clerk. |
| N. J., | Morristown | 8.30 p.m., Mar. 28 | Paving with Amiesite; crushed stone | Thomas H. Wiss, Chr. Committee Sts. & Hwys. |
| Ind., | Shelbyville | 10 a.m., Mar. 29 | Two road graders and one road drag | F. W. Fagel, Co. Aud. |
| N. J., | Elizabeth | 2.30 p.m., Mar. 29 | Road improvement, street paving and road materials | J. L. Bauer, Co. Engr. |
| Wash., | Seattle | 2 p.m., Mar. 29 | Constructing ten miles of road | Byron Phelps, Clk. Co. Comrs. |
| Wash., | Seattle | 10 a.m., Mar. 29 | 20 miles road construction | Byron Phelps, Clk. Co. Comrs. |
| Mich., | Lansing | 4 p.m., Mar. 29 | Furnishing asphaltic cement | John McClellan, City Clk. |
| Neb., | Alliance | 8 p.m., Mar. 30 | 14,625 ft. concrete curb and gutter | G. F. Snider, City Clk. |
| O., | Toledo | 10 a.m., Mar. 30 | Furnishing macadam and other road materials | C. J. Sanzenbacher, Co. Aud. |
| Ind., | Ft. Wayne | 10 a.m., Mar. 31 | Crushed stone | Will Johnson, Co. Aud. |
| N. J., | Bloomsbury | 2 p.m., Mar. 31 | 2.91 miles water bound macadam | Board Chosen Freeholders, |
| N. J., | Paterson | 2 p.m., Mar. 31 | Creosoted plank floor for bridge | County Engineer. |
| O., | Columbus | 2 p.m., Apr. 2 | 39,200 ft. waterbound macadam | J. R. Marker, St. Hwy. Comr. |
| O., | Cincinnati | 2 p.m., Apr. 2 | Repairing county road | Bd. Hamilton Co. Comrs. |
| O., | Cincinnati | Noon, Apr. 2 | Repairing streets | Board of Co. Comrs. |
| O., | Columbus | 2 p.m., Apr. 2 | Road construction, estimated $33,310.25 | State Highway Commission. |
| Ind., | Jeffersonville | 10 a.m., Apr. 5 | Grading, paving and improving road | G. W. Stoner, Auditor. |
| Ind., | Greencastle | 2 p.m., Apr. 5 | Grading, paving and improving road | C. L. Airhart, Co. Aud. |
| Ind., | Greenfield | 10 a.m., Apr. 5 | Grading, paving and improving road | Lawrence Wood, Co. Aud. |
| Minn., | Minneapolis | 11 a.m., Apr. 5 | One or more cars of road oil | Al. P. Erickson, Co. Aud. |
| La., | Lake Charles | 10 a.m., Apr. 5 | Construction of highways Nos. 5 and 7 | E. C. House, Clk. Police Jury. |
| N. D., | Portland | 8 p.m., Apr. 5 | Cement sidewalks for 1915 | A. A. Kappang, City Aud. |
| Ind., | Huntington | 10 a.m., Apr. 5 | Grading, paving and improving roads | Harold Guthrie, Co. Aud. |
| Ind., | Brazil | 10.30 a.m., Apr. 5 | Grading, paving and improving roads | W. O. Graeser, Co. Aud. |
| Wash., | Ephrata | 2 p.m., Apr. 5 | Two miles water bound macadam | Belvidere. |
| Ind., | Salem | Apr. 5 | Constructing two roads | C. T. Sanders, Co. Aud. |
| Ind., | Newport | 10 a.m., Apr. 5 | Gravel road construction | I. H. Rutherford, Co. Aud. |
| N. J., | Plainfield | 8 p.m., Apr. 5 | Concrete pavement | J. T. McMurray, City Clk. |
| Ind., | Covington | 2 p.m., Apr. 6 | Gravel road construction | H. W. Newlin, Co. Aud. |
| Ind., | Greenville | 10 a.m., Apr. 6 | Road construction | Roy Slater, Co. Aud. |
| Wash., | Spokane | Apr., 6 | Paving with asphalt macadam; cost, $150,000 | County Comrs. |
| La., | Lake Charles | 10 a.m., Apr. 6 | Road construction | County Clerk. |
| S. D., | Leola | 3 p.m., Apr. 6 | Grading highways during 1915 | J. B. Wittmayer, Co. Aud. |
| N. D., | Mohall | 2 p.m., Apr. 6 | Two elevating road graders and road grading | Peter Carlson, Auditor. |
| Ind., | Corydon | 2 p.m., Apr. 6 | Grading, paving and improving road | J. L. O'Banning, Co. Aud. |

## BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---|---|---|---|---|
| Ind., | Boonville | 10 a.m., Apr. 6. | Grading, paving and improving road | G. H. Bass, Co. Aud. |
| Ind., | Knox | Noon, Apr. 6. | Grading, paving and improving road | Chas. W. Weniger, Co. Aud. |
| Ind., | Winchester | 10 a.m., Apr. 6. | Grading, paving and improving road | C. E. Tillson, Co. Aud. |
| Ind., | Madison | 1 p.m., Apr. 6. | Grading, paving and improving road | C. S. Tibler, Co. Aud. |
| Wis., | Marinette | 2 p.m., Apr. 7. | 11,000 yds. concrete pavement | Board Public Works. |
| S. D., | McIntyre | 2 p.m., Apr. 7. | County highway grading | Rudolph Jager, Co. Surv. |
| Ala., | Anniston | Apr. 7. | Grading and macadamizing road | County Comrs. |
| Wis., | Marinette | 2 p.m., Apr. 7. | 11,000 yds. concrete paving | A. L. Hillis, City Engr. |
| Ala., | Fort Payne | Apr. 9. | Grading and macadamizing road | County Comrs. |
| Ind., | Indianapolis | 1 p.m., Apr. 9. | Crushed stone, gravel, screenings and slag | Edward Simon, Co. Aud. |
| Kan., | Hutchinson | Noon, Apr. 9. | Improving five miles of road | Geo. W. Lee, Co. Clk. |
| Minn., | Carver | 1 p.m., Apr. 13. | Culverts for state road | County Auditor. |
| Wis., | Prairie du Chein | 8 p.m., Apr. 14. | 9,106 yds. paving, 3,500 ft. curb and gutter | W. H. Turbitt, City Clk. |
| Fla., | Tavares | Noon, Apr. 15. | 200 miles road work | Board of Co. Comrs. |
| O., | Hopewell Center | Noon, Apr. 17. | Road improvement | Carl Snyder, Clk., Bascon. |
| N. Y., | Newburgh | May 4. | Street paving | City Clerk. |

### SEWERAGE.

| | | | | |
|---|---|---|---|---|
| Fla., | Jacksonville | Noon, Mar. 20. | Sewerage system for Pablo Beach | Board Bond Trustees. |
| Minn., | St. Paul | 10 a.m., Mar. 22. | Sewer construction | Aug. Hohenstein, Pur. Agt. |
| Wis., | Appleton | 9 a.m., Mar. 22. | Manhole and catch basin covers; sewer construction | E. L. Williams, City Clk. |
| N. Y., | New York | 2 p.m., Mar. 22. | Altering, constructing and improving sanitary sewers | L. H. Pounds, Pres. Borough. |
| Ore., | Enterprise | Mar. 22. | Two and a half miles sewers & septic tank | City Clerk |
| Ill., | Lincoln | 1 p.m., Mar. 23. | Drainage ditch construction | Comrs. Union Drain. Dis. No. 1. |
| N. Y., | Brooklyn | 11 a.m., Mar. 24. | Sewer construction | L. H. Pounds, Boro. Pres. |
| N. Y., | Brooklyn | 3 p.m., Mar. 25. | Sanitary sewer construction | Park Commissioners. |
| Minn., | Mankato | 1.30 p.m., Mar. 25. | Drainage ditch construction | C. L. Kennedy, Co. Aud. |
| O., | Urbana | Noon, Mar. 25. | Constructing storm sewers | H. M. Crow, Clerk. |
| Minn., | Mankato | 1.30 p.m., Mar. 25. | Digging and constructing ditch | C. L. Kennedy, Co. Aud. |
| Ind., | Huntington | 1 p.m., Mar. 27. | Drainage ditch construction | J. B. Vernon, Drainage Comr. |
| Ind., | Gary | Mar. 29. | Sewer construction, tile, manholes and catch basins | H. C. Francis, City Clk. |
| Cal., | Huntington Bch. | 7.30 p.m., Mar. 29. | Outfall sewer and septic tank | City Clerk. |
| Ia., | Burlington | 9 a.m., Mar. 29. | Furnishing sewer pipe | Robt. Kroppach, City Clk. |
| Ariz., | Phoenix | 2 p.m., Mar. 29. | Sewer system for Indian school | Cato Sells, Comr. Indian Affairs, Washington, D. C. |
| Ia., | Emmetsburg | 1 p.m., Mar. 29. | Constructing drainage improvement | W. E. Eagan, Auditor. |
| Ind., | South Bend | Mar. 30. | Sewer construction | A. P. Perley, Clk. Bd. P. Serv. |
| Wash., | Enunclaw | Mar. 31. | Constructing 13,000 ft. of sewer | W. I. Lippard, City Engr. |
| Ind., | Indianapolis | Mar. 31. | Sewer construction to cost $318,000 | Board Public Works. |
| Mich., | Flint | 3 p.m., Apr. 1. | Constructing storm sewer | D. E. Newcombe, City Clk. |
| Ill., | Maywood | 8 p.m., Apr. 1. | Eight miles concrete and vit. lateral and outlet sewers | Board Local Improvements. |
| Minn., | Brainerd | 8 p.m., Apr. 5. | Lateral sewer construction | A. Mahlum, City Clk. |
| Minn., | Wadena | 2 p.m., Apr. 6. | Drainage ditch construction | Eugene Ross, Co. Aud. |
| Wis., | Appleton | 10 a.m., Apr. 19. | Constructing drainage ditches | Bd. of Supv. of the Town of Deer Creek. |
| La., | New Orleans | Apr. 19. | Additions to drainage pumping station | Sewerage & Water Board. |
| Ind., | Hartford City | 10 a.m., Apr. 20. | Ditch construction | F. P. Wallace, Co. Surveyor. |

### WATER SUPPLY.

| | | | | |
|---|---|---|---|---|
| Ill., | Oquawka | 11 a.m., Mar. 20. | Complete oil or gas driven pumping plant | Henderson Co. Drain. Dist. 3. |
| Kan., | McCune | Mar. 20. | Constructing deep wells and reservoir | City Clerk. |
| Mo., | Caruthersville | Mar. 22. | Digging 10-in. well | J. M. McGinnis, City Clerk. |
| N. C., | Asheville | Mar. 22. | 186 tons 10-inch pipe | J. E. Rankin, Mayor. |
| Kan., | Fredonia | Mar. 22. | Pipe line, pumping machinery and filtration plant | C. B. DeTar, Supt. Water Wks. |
| Wis., | Reedsburg | 7.30 p.m., Mar. 22. | One carload 4-inch Class C c. i. pipe | Wm. H. Dierken, City Clk. |
| Pa., | Pittsburgh | 10 a.m., Mar. 22. | Fire hydrants, c. i. pipe and pig lead | F. T. Booth, Dir. Dept. Sup. |
| Ky., | Louisville | 8 p.m., Mar. 23. | 7,200 ft. 4 and 6-in. c.-i. pipe | J. L. O'Neil, City Clk. |
| N. Y., | New York | 11 a.m., Mar. 23. | Six buildings at Kensico Reservoir | Comrs. of Bd. Water Supply. |
| O., | Toledo | Noon, Mar. 23. | Laying a 24-in. water main across the Maumee river; 3,000 curb boxes | A. W. Boardman, Dir. Pub. Ser. |
| N. J., | Perth Amboy | 8 p.m., Mar. 24. | Pumping engine for waterworks | Peter Kroeger, Clerk |
| N. Y., | New York | 2 p.m., Mar. 24. | Constructing high pressure headquarters building | Wm. Williams, Comr. |
| N. D., | Fargo | 9.30 a.m., Mar. 24. | 6-inch water main construction | A. R. Watkins, City Aud. |
| Ill., | Maywood | 8 p.m., Mar. 25. | 21,590 ft. 4 and 6-inch c. i. pipe | Board Local Improvement. |
| N. Y., | New York | 2 p.m., Mar. 25. | Supplies for department; c. i. pipe, hydrants and special castings | Wm. Williams, Comr. |
| Va., | Richmond | Noon, Mar. 26. | 800 tons aluminum sulphate, gate valves, hydrants, lead and c. i. pipe | E. E. Davis, Supt. W. W. |
| Mo., | St. Louis | Noon, Mar. 26. | Laying water pipe | Board Public Service. |
| Ind., | La Porte | 10 a.m., Mar. 27. | Centrifugal pump, capacity 2,800 gals. per minute | Wm. F. Kreuger, City Clk. |
| Mont., | Lewiston | Mar. 29. | Furnishing pipe and fittings | City Clerk. |
| Greece, | Athens | Mar. 30. | Water supply for Athens and additional cities, estimated cost, $14,000,000 | Bur. of Foreign & Domestic Commerce, Wash., D. C. |
| O., | Toledo | noon, Mar. 31. | High pressure fire service pumping station | A. W. Boardman, Dir. Pub. Ser. |
| Mass., | Middleboro | Apr. 1. | 500,000-gal. concrete tank, to cost $25,000 | City Clerk. |
| Colo., | Montrose | Apr. 1. | Reconstructing and extending water works | P. W. Pinkerton, City Engr. |
| Wash., | Seattle | Apr. 2. | Two pumps and two motors | Board Public Works. |
| Ont., | Toronto | Noon, Apr. 13. | Check and automatic valves | T. L. Church, Mayor |
| Minn., | Winona | 4 p.m., Apr. 15. | Drilling four artesian wells | Board of Municipal Work. |
| Ga., | Jefferson | Apr. 19. | 150 tons c.-i. pipe, hydrants, filters, pumps, etc | Homer Hancock, Clerk. |
| La., | New Orleans | Apr. 19. | Additions to pumping station | Sewerage & Water Board. |

### LIGHTING AND POWER.

| | | | | |
|---|---|---|---|---|
| Fla., | Jacksonville | Noon, Mar. 20. | Electric light plant for Pablo Beach | Board of Bond Trustees. |
| R. I., | Providence | 2.15 p.m., Mar. 22. | Electrical work for city hall addition | Board Contract & Supply. |
| N. Y., | New York | 11 a.m., Mar. 23. | Furnishing and maintaining open flame mantle gas lamps for street lighting | Wm. Williams, Comr. |
| O., | Columbus | Noon, Mar. 25. | Wire and carbons | G. A. Borden, Dir. P. S. |
| Ind., | La Porte | 10 a.m., Mar. 27. | 150 h. p. induction motor | Wm. F. Kreuger, City Clk. |
| S. D., | Madison | 8 p.m., Mar. 29. | 350 h.p. engines, generator and other equipment | William Rae, City Aud. |
| O., | Middletown | Noon, Mar. 30. | Street lighting; installing ornamental lighting system | City Commission. |
| Mich., | Detroit | 3 p.m., Mar. 30. | Electric freight elevator in post office | O. Wenderoth, Washington. |
| Pa., | Pittsburgh | Noon, Apr. 3. | Electric light plants | Capt. H. C. Fisk, U. S. Engrs. Office. |
| Ia., | Ames | 7 p.m., Apr. 5. | Electric work on city hall | A. B. Maxwell, City Clerk. |
| Pa., | Pittsburgh | Noon, Apr. 5. | Two boilers; two pumps | Harold C. Fiske, Captain, U. S. Engrs. Office. |

### FIRE EQUIPMENT.

| | | | | |
|---|---|---|---|---|
| N. Y., | Syracuse | Mar. 23. | Fire engine house | R. A. Doney, Sec. Bd. Con. & S. |
| D. C., | Washington | 10 a.m., Mar. 23. | Fire sprinkler system for the Naval Station at Newport, R. I. | S. McGowan, Paymaster Gen'l. |
| O., | Canton | Mar. 24. | Motor service truck | R. J. Kunkel, Dir. Pub. Safety. |
| Pa., | York | Mar. 24. | 3,000 ft. cotton rubber-lined hose | F. S. Bentzel, Supt. P. Safety. |
| O., | Canton | Noon, Mar. 24. | Motor-driven hook and ladder | R. J. Kunkel, Dir. Pub. Safety. |
| O., | Marion | Noon, Mar. 25. | 1,500 ft. 2½-inch hose | E. T. Smart, Dir. Pub. Safety. |
| O., | Girard, noon | Mar. 25. | One triple combination | R. L. Sanford, Vil. Clerk. |

## BIDS ASKED FOR

| STATE | CITY | REC'D UNTIL | NATURE OF WORK | ADDRESS INQUIRIES TO |
|---|---|---|---|---|
| O., | Akron | Noon, Mar. 30. | Construction central fire station | Dan P. Stein, Director P. S. |
| N. Y., | Plattsburgh | Apr. 6. | Automobile triple combination | Common Council. |
| D. C., | Washington | 10 a.m., Apr. 6. | Hose | S. McGowan, Paymaster Gen'l. |
| S. C., | Charleston | Apr. 7. | Motor triple combination | Louis Behrens, Chief. |

### BRIDGES.

| | | | | |
|---|---|---|---|---|
| Mont., | Billings | Mar. 20. | Two bridges to cost $77,000 | Board County Comrs. |
| O., | Cleveland | 10 a.m., Mar. 20. | Bridge | E. G. Krause, Clk. Co. Comrs |
| N. Y., | Elma | 2.30 p.m., Mar. 20. | Reinforced concrete arch highway bridge | N. Hucker, Jr., Twn. Clk. |
| Tenn., | Rogersville | Mar. 20. | Steel bridge 1,600 feet long | Albert Lyons, Chr. Bridge Com. |
| Wash., | Everett | Mar. 22. | Trestle bridge 255 ft. long | H. Mumm Jr., County Engr. |
| Kan., | Newton | Noon, Mar. 22. | Construction of two bridges | C. A. Young, County Clerk |
| Pa., | Reading | 10 a.m., Mar. 22. | Repairs to bridge | D. H. Hoch, Controller. |
| O., | Toledo | Noon, Mar. 23. | Lowering a culvert | A. W. Boardman, Dir. P. S |
| Neb., | Red Cloud | Noon, Mar. 23. | Culvert and bridge constructing during 1915 | J. J. Garber, Co. Clk. |
| Minn., | Crookston | 2 p.m., Mar. 23. | 12 to 48-inch metal culverts for 1915 | H. J. Welte, Co. Aud. |
| N. J., | Trenton | 2.30 p.m., Mar. 23. | Reinforced concrete bridge to cost $11,500 | Board of Chosen Freeholders. |
| N. J., | Trenton | 2.30 p.m., Mar. 23. | Repairing stone arch bridge | J. J. Bower, Director. |
| Kan., | Concordia | Mar. 24. | Five reinforced concrete bridges | G. C. Gilbert, Co. Clerk. |
| Minn., | Roseau | 3 p.m., Mar. 24. | Building two state bridges | S. G. Bertilrud, Co. Aud. |
| O., | Hamilton | Mar. 24. | Bridge, $45,000 | County Commissioners |
| Fla., | Jacksonville | Mar. 25. | Bridge construction | Duval County Comrs. |
| Tenn., | Clinton | Mar. 25. | Constructing two bridges over the Clinch River | Co. Bridge Commission. |
| Mass., | Salem | 9.30 a.m., Mar. 25. | Bituminous roadway over bridge | County Commissioners. |
| Ill., | Monee | 2 p.m., Mar. 27. | Constructing reinforced concrete bridge | E. P. Heft, Town Clk. |
| Pa., | Meadville | Mar. 27. | Concrete bridge construction | Supervisors of E. Mead. Twp. |
| Ill., | Joliet | 2 p.m., Mar. 27. | Reinforced concrete bridge, cost $1,235 | W. H. Smith, Co. Supt. Hwys. |
| Pa., | Reading | Mar. 27. | Repairs to bridges | County Commissioners. |
| Mass., | West Groton | Mar. 29. | Building bridge over the Squannacook River | Town Clerk. |
| O., | Delaware | Mar. 30. | Bridge construction | County Comrs. |
| S. D., | Capa | Mar. 30. | Grading bridge approaches | A. E. Byl, Twp. Clerk. |
| O., | Eaton | 1 p.m., Mar. 31. | Constructing various bridges | G. W. Rehfuss, Co. Aud. |
| N. B., | Moncton | Noon, Mar. 31. | Bridge over the Petitcodiac River | Department Pub. Wks., Fredericton. |
| O., | Marion | Apr. 2. | Abutments and wing walls for bridge | V. P. Garfield, Clk. Co. Supv. |
| Ind., | Paoli | 2 p.m., Apr. 5. | New bridge floor | E. A. Palmer, Auditor. |
| N. M., | San Marcial | Apr. 5. | 450-ft. span pony truss steel bridge | Co. Comrs., Sosorro. |
| O., | Warren | 1 p.m., Apr. 5. | Bridge over Mahoning River | W. R. Harrington, Co. Aud. |
| Cal., | Calusa | Apr. 6. | 37 concrete bridges, 6 to 2,600-ft. span | J. W. Kaerth Eng. Co., Supv. |
| La., | Lake Charles | 10 a.m., Apr. 6. | Steel highway bridge over Black Bayou | Police Jury, D. C. House, Clk. |
| N. D., | Bathgate | 2.30 p.m., Apr. 6. | Constructing seven bridges | W. W. Felson, Co. Aud. |
| S. D., | Leola | 3 p.m., Apr. 6. | 12 to 72-inch galvanized corrugated steel culverts | J. R. Wittmayer, Co. Aud. |
| N. D., | Jamestown | 2 p.m., Apr. 6. | Corrugated galvanized metal steel culverts | County Auditor. |
| N. D., | Ypsilanti | 2 p.m., Apr. 6. | 80-foot steel bridge over James River | County Auditor. |
| Ia., | New Hampshire | 1.30 p.m., Apr. 7. | Five steel truss bridges and steel for ten I-beam bridges. | P. E. McGinn, Co. Aud. |
| Ia., | Sibley | 1 p.m., Apr. 7. | Two steel and 36 cement bridges | D. W. Clayton, Co. Aud. |
| Minn., | Chaska | Apr. 13. | Corrugated metal culvert | J. B. Connolly, Auditor. |
| O., | Hamilton | Apr. 17. | Concrete bridge 600 feet long, to cost $85,000 | W. W. Crawford, Co. Aud. |
| Ky., | Litchfield | Apr. 27. | Bridge 85 feet long | Ed. Butler, Co. Rd. Engr. |

### MISCELLANEOUS

| | | | | |
|---|---|---|---|---|
| O., | Toledo | Noon, Mar. 20. | One general service automobile | Board of Park Comrs. |
| Ill., | Chicago | 11 a.m., Mar. 20. | 1,000 tons limestone dust, 18,000 yds. sand and 12,000 bbls. Portland cement | L. E. McGann, Comr. P. W. |
| Fla., | Jacksonville | Noon, Mar. 20. | Work on municipal terminals | Board of Port Comrs. |
| Minn., | St. Paul | 10 a.m., Mar. 22. | 12,000 bbls. cement; 12,000 gals. oil tank; 3,000 tons crushed stone | Aug. Hohenstein, Pur. Agt. |
| N. J., | Asbury Park | 8 p.m., Mar. 22. | Reinforced concrete or creosoted timber sea wall | C. F. Burney, Boro. Clk. |
| Cal., | San Diego | 5 p.m., Mar. 22. | Repairing electric tower | R. E. Walter, City Clerk. |
| R. I., | Providence | 2.15 p.m., Mar. 22. | 10,000 yards filter cloth | Board Contract & Supply. |
| Minn., | Duluth | 10 a.m., Mar. 22. | Pressure oil-spraying machine | C. S. Palmer, City Clerk. |
| D. C., | Washington | Mar. 22. | U. S. post office at Everett, Wash | Supervising Architect. |
| Colo., | Greeley | 11 a.m., Mar. 22. | Construction of court house | W. N. Bauman, Arch., Denver. |
| Ia., | Iowa City | 10 a.m., Mar. 22. | 5,000 lbs. Portland cement | W. J. Freeman, Co. Clk. |
| Mass., | Boston | Noon, Mar. 22. | Building parkway | Metropolitan Park Comn. |
| N. J., | Freehold | 11 a.m., Mar. 23. | Constructing sea wall at Galilee | John M. Corlies, Director. |
| N. Y., | New York | Noon, Mar. 23. | Paper and rubbish trucks and 220 department carts | J. T. Fetherston, Comr. St. Cl. |
| N. Y., | Schenectady | 2.30 p.m., Mar. 24. | Collection and removal of garbage, ashes and rubbish for five years | Deputy City Engineer. |
| N. Y., | New York | 2 p.m., Mar. 24. | Nine 1½ tons motor trucks | Wm. Williams, Comr. |
| O., | Columbus | noon, Mar. 25. | Two motor trucks | G. A. Borden, Director P. S. |
| N. Y., | New York | 2 p.m., Mar. 25. | Signboards for markets | M. M. Marks, Pres. Boro. |
| Neb., | Norfolk | 2 p.m., Mar. 25. | Repairs and alterations to Post Office | A. G. Nelson, Custodian. |
| D. C., | Washington | 11 a.m., Mar. 27. | 15-ton, four-motor traveling crane | H. R. Stanford, Chief, Bureau Yards & Docks, Navy Dept. |
| Wash., | Puget Sound | 10 a.m., Mar. 30. | Steel storage tank | Navy Pay Office. |
| Va., | Norfolk | Mar. 30. | Garbage incinerator for Navy Yard | Bureau of Supplies & Accounts, Washington, D. C. |
| Pa., | Matamoras | noon, Apr. 3. | Concrete block Borough Building | F. W. Kesting, Secy. |
| Ill., | Rock Island | 2 p.m., Apr. 3. | 12-ton garbage incinerator | M. T. Rudgren, City Clk. |

## STREETS AND ROADS

**Texarkana, Ark.**—City Engineer Haydon is busy preparing specifications for paving work to be carried on Maple St. and other districts which are in formation.

**Tucson, Ariz.**—A resolution of intention to pave Scott St. between Congress and 14th Sts. and Jackson and Ochoa Sts. between Scott and Stone Ave. has been passed by city council.

**Auburn, Cal.**—Supervisors of Placer County have voted to appropriate $5,000 toward construction of road from Tahoe City to Nevada State line, along Lake Tahoe shore. There is a bill before Legislature asking for similar appropriation.

**Oakland, Cal.**—Bids for $100,000 worth of street work, nearly all in annexed district, have been received and opened by city council. The paving and sewering bid formed a part of extensive plan of Commissioner of Streets W. J. Baccus for rapid development of streets in Melrose and Fitchburg sections. Following are improvements and bidders: Oil macadamizing of Forrest St., between Locksley and Oak Grove Aves., and a portion of Miles Ave. adjacent; Bates, Borland & Ayer; E. H. Sundberg. Oil macadamizing of 82d Ave., from East 14th St. to the southwest line of the Briggs tract; Ransome-Crummey Co., Hutchinson Co., D. U. Toffelmier, and Bates, Borland & Ayer. Oil macadamizing of 87th Ave., north of E. 14th St.; Ransome-Crummey Co., John Ward, Hutchinson Co., D. U. Toffelmier, and Bates, Borland & Ayer. Oil macadamizing of Persimmon St., between Davis and School Sts., and a portion of Penniman Ave., adjacent to Persimmon St.; Hutchinson Co., Ransome-Crummey Co., E. H. Sundberg, and Bates, Borland & Ayer. Asphalting of 16th St., between Market and Peralta Sts., Ransome-Crummey Co., Bates, Borland & Ayer, W. J. Jessup, Federal Construction Co., and City Street Improvement Co.

**Santa Ana, Cal.**—Improvement of Cypress Ave. is planned.

**San Diego, Cal.**—Board of Supervisors have passed resolution appointing Chairman A. P. Smith, Col. Ed. Fletcher and Attorney W. Jefferson Davis, a committee to go before legislature and urge passage of bill providing for appropriation of $200,000 for extension of state highway from El Centro to Yuma, thereby completing roadway from the Oregon line to San Diego, thence to El Centro and Yuma, Ariz.

**Stockton, Cal.**—Plans and specifications for Borden road bridges across Middle and Old rivers have been filed with Board of Supervisors by County Surveyor Frank E. Quail. Estimate for work as provided by county surveyor is $122,000.

**Stockton, Cal.**—About two miles of road will be improved in Linden district.

**Bridgeport, Conn.**—Paving bonds in sum of $200,000 may shortly be offered for sale.

**Dover, Del.**—Representative Webster's bill, providing for rebuilding by New Castle County of Philadelphia turnpike

between Pennsylvania line and Wilmington has been passed by House. The original bill provided for county to borrow sum of $110,000 for this purpose, but substitute reduced amount to $75,000 and governor is to appoint commission of three members to supervise building of road.

**Jacksonville, Fla.**—Scoria block with granite curbing will be material out of which sidewalk along south side of the warehouse of the Atlantic and East Coast Terminal Company on West Bay St. will be laid. This matter has been definitely settled by committee on public works.

**Sanford, Fla.**—At called meeting in city hall question of bonding county of Seminole for sum of $500,000 for brick roads was discussed in all its phases.

**Augusta, Ga.**—City will lay about 12,740 sq. ft. sidewalk in city cemetery.

**Peoria, Ill.**—Bids will be received March 16 at 2 p. m. for State and 2d Sts. paving, consisting of about 23,790 yds.

**Brazil, Ind.**—Purchase of street flusher is being discussed.

**Kokomo, Ind.**—Residents of East Walnut St. have petitioned that street be improved east of Pennsylvania railroad tracks. Board is inclined to grant request if possible. Engineer submitted estimates for four improvements in Conradt addition, as follows: Sycamore St., $7,090; Home, $9,007; Cherry, $2,157; Maple, $4,311.

**Mishawaka, Ind.**—Petition has been presented to Board of Public Works by residents of East Joseph St., who seek to have that street paved from Main St. to river.

**South Bend, Ind.**—Arrangements have been completed by which Fletcher National Bank and Breed, Elliott & Harrison, of Indianapolis, agreed to take bonds in sum of $180,000 bearing date from Oct. 1, 1914, subject to approval of bonding attorneys, for construction of Lincoln Highway west from city limits of South Bend to Laporte county line.

**Dubuque, Ia.**—Office of public roads at Washington, the Iowa state highway commission and Dubuque county board of supervisors are now agreed on all details of proposed improvement of Hawkeye highway in this county. Government engineers, it is expected, will be in Dubuque in course of next two weeks to start preparations for advertising for bids for work. Government and county will let contracts for approximately $130,000, for road work and structures that will eliminate grade crossings on the highway.

**Dubuque, Ia.**—Notice has been given of the proposed improvement of Martha St., consisting of 780 sq. yds. of macadam, 536 lin. ft. of cement curb and gutter, 1,360 cu. yds. of cutting, 20 cu. yds. of filling, making total estimated cost to abutting property owners of $987. Also of alley between Grant Ave. and Center Pl., consisting of Hillside brick paving: 615 sq. yds. of Hillside brick paving, making a total estimated cost to the abutting property owners of $1,384. If cement paving: 615 sq. yds. of cement paving, making a total estimated cost to the abutting property owners of $1,169.

**Dubuque, Ia.**—B. H. Burrell, engineer in employ of United States Department of Public Roads, has arrived in Dubuque ready to open office and take charge of work of improving Hawkeye highway, lying between Dubuque and Dyersville, in this county. The work that Mr. Burrell will have general supervision of calls for an outlay by government and this county of about $130,000. Mr. Burrell expects to advertise for bids for work without delay.

**Forest City, Ia.**—Resolution has been adopted for curbing, grading, guttering and paving certain streets and alleys. G. B. Chryst is Town Clerk. Following are estimated quantities: 32,000 sq. yds. sheet paving and 1,000 yds. alley approach paving, 22,000 lin. ft. combined curb and gutter and 3,000 ft. storm sewer. Two miles in paved district. Theo. S. De Lay is Civil Engr.

**Pittsburg, Kan.**—Ordinance has been passed to provide for curbing and guttering, grading and paving of Adams Ave. from west line of Broadway to east line of Catalpa Ave., known as Curbing District No. 72-C and Paving District No. 92-P.

**Salina, Kan.**—Paving of N. 13th and Bishop Sts. has been ordered.

**Salina, Kan.**—Plans and specifications on various proposed strips of paving are being prepared by Paul Wakenhut, city engineer.

**Barbourville, Ky.**—Goods roads movement in Southeastern Kentucky was given additional boost when Knox County voted over nine to one to issue bonds to amount of $200,000 for highway construction.

**Carlisle, Ky.**—First good roads meeting, in interest of bond issue of $125,000 for constructing roads in Nicholas County, is being held here. Nicholas County will vote on question of issuing bonds on March 27. Campaign is to be carried on with good roads meetings in several precincts of county.

**Hickman, Ky.**—Petitions have been circulated throughout various magisterial districts of this county, asking County Judge to call special meeting for purpose of ascertaining wish of voters of this county on proposition of issuing bonds in sum of $300,000 to be used in building gravel roads over county, and these petitions have been presented to Judge E. J. Stahr. Present plans are to have a vote on this question on Saturday, May 22. If this is carried, it will give 210 miles of good, hard roads in Fulton County.

**Louisville, Ky.**—Contracts for construction, reconstruction and repair of roads of Jefferson County will probably be let by Fiscal Court at next meeting, bids for the work having been opened by court and referred to committees of various Magisterial districts. Contracts to be let call for expenditure of between $40,000 and $50,000. Lowest bid received for reconstruction of River road, calling for 5,000 sq. yds. of macadam to be used on road from city limits to county line, was $6,830, made by Hoke Co. For 5,000 cu. yds. of macadam and 800 cu. yds. of screening to be used on Newberg road, Bickel Co. bid $8,509.40. This was lowest bid for this work and calls for water bound macadam. On Preston St. road, for space between bituminous concrete and water bound macadam, distance of three-fourths of a mile, the Hoke Co. bid $3,457 for bituminous macadam, penetration method; the American Standard Asphalt Co., $4,690, bituminous concrete, and Bickel Asphalt Co., $5,470, for rock asphalt. These were lowest bids for three classes of construction received by court. For construction of Wellington Ave. and various other streets in Beechmont lowest bid, $2,883, was made by John E. Hodgins. This bid calls for macadam water bound roads. Lowest bid for building of bridge over Big Run, on 18th St. road, was $1,666.05, made by T. B. Miller.

**New Albany, Ky.**—E. B. Coolman has submitted estimate of cost of proposed improvement of Budd road and Payne-Koehler road, placing cost of Budd road at $17,277 and Payne-Koehler road at $11,851.

**New Albany, Ky.**—County macadamized road bonds to amount of $37,120 have been sold by Board of County Commissioners to Rudolph Kleybolte Co., of Cincinnati. Bonds were issued to cover cost of constructing Slate Run road, Grant Line road, and Green Valley road. Aggregate contract price of three highways is $34,884, as follows: Slate Run road $10,270; Grant Line road $16,777, and the Green Valley road $7,037.

**Paducah, Ky.**—Plans are being made for road improvements, to be made from $300,000 bond issue which has just been carried.

**Wickliffe, Ky.**—The Ballard County Fiscal Court has made application for State aid to build roads in accordance with bond issue of $300,000 voted. The State is expected to pay county $12,000 annually in payment of one-half of the bond issue.

**Lake Charles, La.**—Cause of good roads in southwest Louisiana has received notable boost when police jury of Jefferson Davis parish, by unanimous vote, adopted ordinance submitting to people proposition to issue $400,000 in bonds for purpose of gridironing parish with improved highways. Election will be held in April.

**Lake Charles, La.**—Date for good roads bond election in Jefferson Davis parish has been made July 27, in order to give plenty of time for an educational campaign.

**Cumberland, Md.**—Approximately $96,800 has been asked by County Road Directors, to be appropriated by County Commissioners for road work in county for this year. In estimate of amount needed, Road Directors stated they wish to improve 500 miles of earth roads at $100 per mile, totaling $50,000.

**Beverly, Mass.**—Sum of $38,000 has been appropriated for paving.

**Duxbury, Mass.**—Town has voted to accept offer of state for macadamizing street; will cost $20,000, of which town will pay one-third.

**Gloucester, Mass.**—Loan of $10,000 has been ordered for improvement of Essex Ave.

**Lowell, Mass.**—Municipal Council has voted to borrow $25,000 for widening of Rogers St. from High to Nesmith and Nesmith to Boylston Sts., amount to include land damages.

**Reading, Mass.**—Town has appropriated $2,260 for continuing macadamizing of Lowell St.

**Saugus, Mass.**—Appropriation of $650 has been recommended for purchase of automatic oil distributor for street department.

**Springfield, Mass.**—Following bids have been received for materials for street work needed this season. Four bids were receivd for wood block paving, f. o. b. Springfield,, as follows: George M. Stevens & Co. of Boston, $1.84 a sq. yd.; United States Wood Preserving Co. of New York City, $1.849; Jenison-Wright Co. of Toledo, Ohio, $1.89; John M. Noonan & Co., $1.98. The Springfield Brick Co. offered folowing prices per 1,000 for various types of brick: Sidewalk, $11; crosswalk, $11; sewer, $10.50; well, $12. These prices are f. o. b. Springfield. The rates f. o. b. Indian Orchard are $1 higher in each case. For trap rock low bidder was John S. Lane & Son Co. of Meriden, Conn., whose prices a ton were as follows: 2½-in., 90 cts.; 1¼-in., $1; ¾-in. or ½-in., $1.05; screenings, 85 cts. The other bids were as follows: Connecticut Quarries Co. of New Haven, 2½-in.,, $1; 1¼-in., $1.10; ¾-in., or ½-in., $1.15; screenings, $1; Suffield-Berlin Trap Rock Co. of Hartford, 2½-in., $1.10; 1¼-in., $1.15; ¾-in., $1.25; screenings, $1.10. Bids for curbing granite were as follows: Dickinson-Arnold Co. of Haddam, Conn., 4-in. straight rock face, 47 cts. a ft.; 6-in., 53 cts.; 4-in. driveway corners, $2.70; 6-in., $2.90; 4-in. circular, 3 to 5 ft. radius, 75 cts.; 6 to 15 ft. radius, 70 cts.; 16 to 20 ft. radius, 65 cts. These prices are for shipment by way of the Boston & Albany or the Boston & Maine, the prices on the first four items if shipped by the New Haven road are, respectively, 45 cts., 52 cts., $2.60 and $2.80; Hildreth Granite Co., 4-in. straight, 46 cts.; 6-in. straight, 49 cts.; 4-in. corners, $2.85; 6-in. corners, $2.95; 4-in. circular, 3 to 5 ft. radius, 85 cts.; 6 to 15 ft. radius, 65 cts.; 16 to 20 ft. radius, 60 cts.; 6-in. circular, 3 to 5 ft. radius, 90 cts.; 6 to 15 ft. radius, 70 cts.; 16 to 20 ft. radius, 65 cts. Frank M. Malory of Lowell, for 4-in. straight, $.475; 6-in. straight, 51 cts.; 4-in. corners, $2.74; 6-in. corners, $2.89; 4-in. circular, 3 to 5 ft. radius, 83 cts.; 6 to 15 ft. radius, 67 cts.; 16 to 20 ft. radius, 63 cts.; 6-in. circular, 3 to 5 ft. radius, 84 cts.; 6 to 15 ft. radius, 72 cts.; 16 to 20 ft. radius, $6.45. The Hildreth Co. was low bidder on granite block for paving, quoting $1.63 a sq. yd. The Victoria White Granite Co. quoted $1.80 a sq. yd.

**Grand Rapids, Mich.**—Board has adopted Alderman Appel's resolution to pave Monroe Ave. from Sixth St. to Coldbrook St., and will prepare estimates. Estimate on improvement of Dean St. showed it will cost $17,039 to do the work. There were nine bidders. Beultema Bros. being lowest with $16,301.

**Hillsdale, Mich.**—Bids will be received at city clerk's office until 7 p. m. March 26, 1915, for paving about 7,500 sq. yds. on Railroad St., Monroe St. and North St. E. L. Ranney is city clerk.

**Lapeer, Mich.**—Votes April 5 on bonding county for $400,000 for road work, boulevard system and municipal electric light plant.

**Eveleth, Minn.**—W. H Tischer, an assistant county engineer, has completed survey of Peerham road, which is to lead south from Eveleth, distance of 7 miles.

**St. Paul, Minn.**—Representative Thos. McGrath's "paving aid" bill has been indorsed by Ramsey County delegation. The measure provides that City Council can use money out of paving aid fund for paving highways. Committee also indorsed Sanborn-Sudheimer bill empowering county commissioners to issue bonds to build road on Concord St. to South St. Paul. Indorsement was given measure extending date of fall fishing season from October 15 to November 15.

**St. Paul, Minn.**—Prices on creosoted wood paving blocks have been declared too high by city purchasing committee and all bids on blocks were rejected. Lowest was $1.48 a sq. yd. as compared with $1.25 for lowest purchase last year.

**Gulfport, Miss.**—It has been decided by Board of Supervisors that county will

build boulevard between eastern corporate limits of Gulfport and western corporate limits of Biloxi.

**Joplin, Mo.**—A petition of property owners for paving of Sergeant Ave. from 1st to 10th Sts. has been accepted by city council and estimate on cost of laying asphalt macadam on street has been ordered prepared.

**Maryville, Mo.**—Plans are being considered for street paving.

**Norfolk, Neb.**—Nearly six miles of new paving will be laid in Norfolk Sts. this summer. Petitions calling for this amount of paving have already been completed.

**Omaha, Neb.**—For various street improvements following were lowest bids received: For asphaltic pavement, Class "B," from $1.65 per sq. yd. to $2.25; asphaltic concrete pavement, Class "A," from $1.52 to $2.55 per sq. yd.; Purington brick block pavement, Class "B," from $2.12 to $2.50 per sq. yd.; Buffalo brick block pavement, Class "B," $2.15 per sq. yd.; Egyptian brick block pavement, Class "B," from $2.22 to $2.32 per sq. yd.; Egyptian vertical fiber brick pavement, Class "A," from $2.02 to $2.12 per sq. yd.; artificial stone pavement, Class "A," from $1.45 to $1.60 per sq. yd.; Colorado stone curb, Class No. 2, from 85 cts. to 90 cts. per lin. ft.; Kettle River stone curb, Class No. 2, from 83 cts. to 90 cts. per lin. ft.; artificial stone combined curb and gutter, Class "A," from 52 cts. to 58 cts. per lin. ft.; artificial stone curb, Class No. 1, 54 cts. per lin. ft., and Class No. 2, 48 cts. per lin. ft. Low bidders in paving were: Hugh Murphy, J. B. Katz, H. J. Cathroe Co., Samuel Friedman, Geo. J. S. Collins and Offerman Const. Co. Low bidders on curbing as follows: Commercial Land Co., Hugh Murphy, Samuel Friedman, General Construction Co., H. J. Cathroe, M. B. Jensen, Chas. Fricke, Offerman Const. Co., and P. McArdle. Thos. J. Flynn is City Clerk.

**Bayonne, N. J.**—Resolutions have been adopted for improvement of various streets.

**Long Branch, N. J.**—City commissioners have received bids for concrete walks and curbing. Of five bidders, J. M. Hines was low. His bid for laying concrete walks was 10 cts. a sq. ft., and for curbing 20 cts. Gilbert Van Cleaf bid 14.9 for concrete walks and Henry Curtis 20 cts. Wm. H. Alexander bid 25 cts. for interlocking curb. John C. Clark was the only bidder for bluestone. He wanted 45 cts. per lin, ft. for crosswalks. Bids were referred to department of streets.

**Woodcliff, N. J.**—See "Sewerage."

**Albany, N. Y.**—Seven hundred miles of highways are to be constructed by State Department of Highways this year and plans and specifications for number of short roads in different sections are already prepared and awaiting advertising for bids which will be announced shortly so that contracts can be awarded in April. With the $10,000,000 appropriated for use during year of 1915, highway department expects to add chain of short roads to sections of roads already constructed.

**Albany, N. Y.**—The up-State members have combined to pass the McDonald bill appropriating $1,880,000 for State aid for county highways.

**Batavia, N. Y.**—County Highway Superintendent William F. Torrance has examined plans for section of Pavilion-Batavia State highway across town of Bethany, a distance of 4.3 miles and formally approved them. Plans call for slag bottom road, with a water bound limestone top, and engineer's estimate that its total cost will be $51.000.

**Brooklyn, N. Y.**—The board of estimate and apportionment has given thirteen final authorizations for public works in Brooklyn, estimated to cost $61,600; eleven of them were for asphalt paving, nearly all in Coney Island district, where the sewer system has been recently completed. It also gave seven final authorizations for Queens, estimated total value of which is $117,200. Included in these is the grading of the Sutphin road for several miles south of the village of Jamaica, over which the Queens & Manhattan trolley railroad line is to be extended to Nassau County. It includes also grading of Perry Ave., an important thoroughfare of Maspeth for eight blocks, at a cost of $32,000. It gave six preliminary authorizations for Brooklyn, estimated aggregate cost of which is $34,500, and seven for Queens, estimated value $66,000.

**Cooperstown, N. Y.**—Work on Cooperstown-Milford State highway will begin April 15. It is expected that road, which will give Cooperstown a highway to the South, will be completed by Aug. 1.

**Fredonia, N. Y.**—See "Fire Equipment."

**Greene, N. Y.**—Village election will be held March 16, from 1 o'clock to 5 o'clock p. m. At this election proposition to raise $16,000 for construction of macadam roadbed with concrete gutter and curb on Chenango St. from Birdsall Brook bridge through village in connection with State road will be voted upon.

**Lestershire, N. Y.**—People will vote on March 16 on Baldwin St. paving proposition, estimated to cost $35,000.

**Niagara Falls, N. Y.**—Common Council has approved of new pavements estimated to cost $128,000. Here are streets and estimated cost: In 24th St. from Buffalo Ave. to Niagara St., $26,515; in Cudabacg Ave., from Portage Rd. to 27th St., $38,700; in 15th St. from Pine to Pierce Ave., $27,600; in Ashland Ave., from the east line of 15th St. to the west line of 15th St., $1,900; in Weston Ave. from 18th to 22d St., $8,730; in Pine Ave. from Main St. to 40 ft. west of Eighth St., $8,430; in Pine Ave. from Third to Main Sts., $10,660; in alley between Third and Fourth Sts., from Jefferson to Erie Aves., $8,430. The works board will probably call for bids for the works at a meeting to be held next Tuesday night.

**Patchogue, L. I., N. Y.**—Village Trustees have decided to submit to people for vote on March 16, three propositions aggregating more than $10,000. First is expenditure of $7,000 for paving Division St., from Ocean Ave. to bridge across the creek with bituminous macadam; $1,800 for paving on Rider Ave., from Main to Terry Sts.; to expend $2,000 for drawing up plans and specifications for a sewerage system and a disposal plant.

**Rochester, N. Y.**—Council has adopted ordinance providing for block asphalt pavement in Culver Rd., between Parsells Ave. and Rosewood Terrace.

**Rochester, N. Y.**—Final improvement ordinances adopted were: Lundy's la. re-assessment, $6,646.21; McKinster St. pavement, $7,500; Ferris St. pavement, $10,000; Culver Rd. pavement, from Rosewood Terrace to Parsells Ave., $17,000; Gillette St. walks, $1,600; Winton Rd., Merchants Rd. and Atlantic Ave. storm water and sanitary sewer, $105,000; Main St. East sanitary and storm water sewer, $42,000, and Merle St. pavement, $2,500.

**Schoharie, N. Y.**—Board of Supervisors has ratified sale of Schoharie County highway improvement bonds for $10,640, made by County Treasurer David Winnie to H. A. Kahler & Co., of New York City.

**Utica, N. Y.**—Division Engineer J. H. Sturdevant of New York State Highways Department has announced following road building program for this summer: Rome to Durhamville, 15.73 miles; Rome to Verona, 3.70 miles; Vienna to New London, 7.75 miles; Taberg to Thompason, 6.65 miles; Verona to Oneida, 5 miles; Camden to Oswego County line, 5.73 miles; total, 44.56 miles. When these roads are done, Oneida County will have used its share of the $10,000,000 State highways appropriation. The first two pieces mentioned have already been contracted for. The remainder of contracts will probably be let this season.

**Utica, N. Y.**—Board of contract and supply has opened bids for paving on six streets. The aggregate of work on these streets is about 12,400 yards. Paving bid on was: Taylor Ave. from James to Arthur St., 3,170 yds.; Eagle St. from St. Vincent to Mohawk St., 2,520 yds.; Wall St. from Elm to Steuben St., 2,060 yds.; Potter Ave. from Cedar to Breese Sts., 1,260 yds.; Lansing St. from Kossuth Ave. to Nicholas St., 2,280 yds.; and Broadway from Lafayette St. to the Erie Canal, 1,140 yds. Exclusive of all accessories, like tile drains, curbs, etc., bids on paving proper are as follows: John W. Davitt & Co., Troy, per sq. yd., asphalt $2.02, asphaltic concrete $1.94, vitrified brick $2.29. This is for Mexican asphalt. Union Paving Co., asphalt, $1.82, asphaltic concrete, $1.77. This is for the paving on all the streets named except Potter Ave., where the figures are $2.12 for asphalt and $2.07 for asphaltic concrete. The bid of Harry W. Roberts & Co. is: For Trinidad asphalt, $1.94 per sq. yd. on Broad, Eagle and Wall Sts., and $1.98 on Potter, Taylor Ave. and Lansing Sts. For Mexican asphalt, $1.80 on Broad St. and $1.82 on all the others. For bitulithic, $2.20 on Broad and Eagle Sts., $2.22 on Wall, and $2.24 on Potter and Lansing and $2.26 on Taylor Ave. For asphaltic concrete, using Trinidad asphalt, $1.82 on Broad and Eagle Sts., $1.84 on Taylor and Wall, and $1.86 on Potter and Lansing. For asphaltic concrete, using Mexican asphalt, $1.70 on Broad, Taylor and Eagle and $1.72 on the other streets. For vitrified brick, $2.29 on Broad, $2.32 on Eagle and $2.35 on all the other streets. Frank M. Johnston bid $2.45 for vitrified brick on one street. For repairs to sheet asphalt streets, estimated quantity 7,000 yards, the bids were: Harry W. Roberts & Co., $1.18; Union Paving Co., $1.43 per sq. yd. It is believed that firm of H. W. Roberts & Co. is lowest bidder.

**Watertown, N. Y.**—Board of Public Works will decide on type of pavement to be laid on Public Square at meeting on March 15.

**Black Mountain, N. C.**—Black Mountain is to pave its principal streets and put down cement sidewalks. Town voted $10,000 worth of bonds for this purpose last fall and aldermen have sold issue at par.

**Charlotte, N. C.**—The purchase of a road-working outfit and also of an asphalt paving repair outfit has been ratified at meeting of executive board. With this equipment, however, city forces will be in a position to do work at minimum expense and with maximum results. Purchase of rock crusher is now under consideration.

**Durham, N. C.**—Street bond issue of $300,000 will probably be voted on.

**Elizabeth City, N. C.**—Elizabeth City has given order for 1,000,000 bricks with which Riverside Ave. will be paved. This order is for immediate delivery and the work of paving street will begin at once.

**Greensboro, N. C.**—The $100,000 bonds recently voted by Greensboro for paving have been sold to Mercantile Trust & Deposit Co., of Baltimore, and the Wachovia Bank & Trust Co., of Winston-Salem, joint bidders, for $100,590 and accrued interest.

**Greensboro, N. C.**—Paving of four streets has been planned, consisting of about 74,241 sq. yds.

**Hendersonville, N. C.**—The taxpayers of Mills River Township have elected L. H. McKinney, S. J. Whitaker, T. E. Osborne, Henry Lance and M. R. Anderson to spend money and oversee construction of roads in township as result of recent bond issue of $20,000 for road building purposes. It is understood that work will be undertaken at early date and that sand-clay roads will be built.

**Sanford, N. C.**—Lee County highway commissioners have sold $100,000 bond issue.

**Siler City, N. C.**—Center township has voted a $50,000 bond issue for good roads. Three additional townships are to vote April 6. These are: Matthews, in which is progressive town of Siler City, for $50,000; Gulf, for $25,000; and Cape Fear, for $50,000.

**Canton, O.**—Stark county still has about $20,000 in fund with which to improve county roads this year. As county pays half of cost of making new roads this money will pay county's share of paving two miles of road with brick approximately $20,000 a mile or about three and one-half miles of macadamized roads at $12,000 a mile.

**Chillicothe, O.**—City engineer has been instructed by Council to prepare plans and specifications and estimates for paving and sewering Western Ave. from Main St. to corporation line, distance of about 3,600 ft. H. M. Redd is City Engineer.

**Cincinnati, O.**—At meeting of county commissioners Surveyor Cowen's estimate of $79,210 for paving of Hamilton pike, in Cheviot, with granite, was approved and plans and specifications ordered. Also his estimate of $5,745 for improvement of Winton Ave. with macadam, from Springfield pike to Cooper Road.

**Coshocton, O.**—County Engineer A. H. Shaw is surveying Hardscrabble Hill road, just east of Coshocton, and getting in readiness for improvement which will probably be made this spring.

**Coshocton, O.**—Council has passeed ordinance to pave E. Main St. from Main St. to W. & L. E. R. R. Also passed ordinance to sell bonds for paving S. 5th St. from Walnut St. to Pine St. Ordered necessary steps taken to pave N. 5th St. to end from Locust St. Ordered paving of alley between Coshocton Light & Heating Co. plant and Backert Straw Paper Co. and installing storm water sewer; and passed resolution to pave S. 7th St. from Kenilworth Ave. to Bank St.

**Florence, O.**—165 voters in Florence Twp. have authorized issuance of $30,000 in road improvement bonds at special election, while but 14 votes were filed against the project.

**Jefferson, O.**—Bids will be received at office of Board of County Commissioners of Ashtabula county, Jefferson, O., until 1 o'clock p. m. on 29th day of March, 1915, for purchase of bonds of said county of Ashtabula in aggregate sum of $57,000, issued for improvement of Niles-Ashtabula I. C. H. Ashtabula section south improved road.

**Marietta, O.**—Matter of calling for election for $750,000 worth of road bonds for Washington County will be taken up at county commissioners' meeting on March 17.

**Middletown, O.**—Bids will be received at office of City Auditor of city of Middletown, O., until 12 o'clock noon, on March 25, 1915, for purchase of bonds of city in aggregate amount of $25,510.50, issued for purpose of paying property owners' portion of cost and expense of improving Second St. and Sixth St. by paving roadway with sheet asphalt. L. T. Nein is Auditor.

**Navarre, O.**—Owners of property in Main and Canal Sts. will pay $21,000 and village $7,000 for paving of two thoroughfares ordered by village council.

**Navarre, O.**—Village council has unanimously passed resolution declaring it necessary to improve, by paving, Main St. from Wooster St. to canal bridge, and Canal St. from the basin to alley dividing Navarre from Bethlehem.

**Newark, O.**—Resolutions have been adopted for improvement of various streets.

**New Philadelphia, O.**—Tuscarawas Co. road improvement bonds in sum of $45,000 have been sold to Fifth-Third National Bank of Cincinnati, at premium of $1,197.23.

**Niles, O.**—Resolution has been adopted for improvement of various streets.

**Niles, O.**—Resolution has been adopted declaring it necessary to improve East Park Ave. from Mosquito Creek bridge to Grant St., by grading, draining, curbing and paving the same.

**Salem, O.**—Ordinance has been passed determining to proceed with improvement of McKinley Ave., from East Main St. east to the corporation line by repaving with vitrified brick block.

**Sandusky, O.**—Ordinance has been passed to issue bonds for purpose of paying city's portion of expense of paving certain portions of Fulton St. and reconstructing a sewer therein.

**Sandusky, O.**—Plans and specifications for the strip of Cleveland-Sandusky Rd. in Vermilion Twp., which will be improved this spring, have been bulletined at county commissioners' office, following receipt of them from state highway department. Plans furnish accurate description for every item pertaining to construction of 4.32 miles of pike which will be sold.

**Youngstown, O.**—Road commissioners will receive bids and will sell to highest responsible bidder on 31st day of March, 1915, at 1 o'clock p. m., in court house in city of Youngstown, in said county, to amount of $66,000, for purpose of building and improving roads in said district in Mahoning County, Ohio.

**Baker, Ore.**—Purchase of auto street flusher is being considered. Commissioner Finley is securing prices on latest type of street cleaning devices.

**Hood River, Ore.**—City council has sold to the Fanchett Bond Co., of Chicago, following bond issues: Twelfth St. improvement bonds, totaling $6,317; Heights sewer bonds, amounting to $5,560.

**Beaver, Pa.**—See "Sewerage."

**Chester, Pa.**—In order named, the following streets will be paved: 7th, Penn to Butler; Penn, Front to 3d; 2d, Penn to Fulton; 9th, Highland Ave. to Booth; Edgmont Ave., 24th St. to City Line.

**Connellsville, Pa.**—Council has decided to purchase road grading machine for use in scraping dirt streets. This will cost $100. It was also decided to ask representatives of various street flushing machine companies to furnish machines for a month's free trial, with understanding that if flusher is found to be an economical proposition, best machine will be purchased. Street department faces proposition of buying additional hose for street washing, or purchasing flusher at cost of about $800.

**Connellsville, Pa.**—Street paving under money available from $100,000 bond issue has been given big start by adoption of resolution providing that bids be advertised for grading, curbing, guttering and paving of following streets: South Pittsburg, North Pittsburg, Murphy Ave., Cottage to Main; Cottage Ave., Fayette to Murphy; Cottage Ave., Main to Apple; Pinnacle Alley, Apple St., Morrell Ave., Front St., 9th St., Washington Ave., Isabella Rd. It was further dicided to advertise for bids on 500,000 of No. 1 paving blocks, to be used in improvement work.

**Dillsburg, Pa.**—A large petition is being circulated by business men of Wellsville and Dillsburg for signers, which will be sent to Governor Brumbaugh, asking that state may rebuild road from Rossville to York.

**Anderson, S. C.**—Supervisor J. Mack King has signed formal order for election to be held in Anderson Co. on 30th inst. on question of county issuing $750,000 of good road bonds.

**Columbia, S. C.**—Governor Manning has approved act providing for election on bond issue of $200,000 for permanent road improvement in Union County. Acts were also passed and have been approved providing for issues of $1,250,000 in Richland County and $950,000 in Greenville County.

**Chattanooga, Tenn.**—Repaving of Market St. with modern paving material is being considered.

**Austin, Tex.**—The attorney general's department has approved a $16,000 bond issue of city of Mount Pleasant for street improvement, 40s, 5 per cent.

**Belton, Tex.**—An election was held in Road District No. 16, Bell County, to determine whether or not bonds in sum of $4,000 should be issued for building of roads. Proposition carried, vote being 17 to 6 in favor of bonds.

**Brownwood, Tex.**—County Judge F. H. Sweet has prepared petitions for formation of two new road districts in Brown Co., providing for bond issues of $30,000 in each district. These proposed new districts join Brownwood district, in which $150,000 has been spent for good roads, on northeast and southeast, and extend to county line. With good roads in these two districts, two-thirds of county will have macadamized roads to county line.

**Bryan, Tex.**—A road bond issue of $400,000 for Bryan district, comprising four justice precincts, has been passed at election by majority of nearly four to one.

**Cameron, Tex.**—John Watson, County Judge, has sold Thorndale road district bonds for $100,000 at par and advertisements for bids for work will be made and work will soon start in that district.

**Cisco, Tex.**—A $100,000 contract has been entered into by commissioners' court of Eastland County for improvement of roads in Eastland County.

**Corpus Christi, Tex.**—City Council has made public its plan for street paving, city on last Feb. 5 having voted $100,000 in bonds to pay city's one-fourth pro rata costs.

**Dallas, Tex.**—City Park Board has agreed to donate $1,500 toward street improvement by extending Turney Ave. to connect with Harwood St. Park Board joined with property owners in petitioning Board of City Commissioners to order the improvement.

**Fort Worth, Tex.**—County Commissioners' Court has issued call for election April 6 to vote on issuance of $350,000 bonds for new county jail and $200,000 for roads. Proposed road fund would be used to connect cross roads and laterals with cardinal and subcardinal roads of county's new $1,000,000 highway system.

**Fort Worth, Tex.**—Notice to contractors to submit bids to City Commission March 16 for construction of macadam roads within city limits to connect paved streets with three county cardinal roads has been published. The bids called for are on Mansfield, Azle and Haslet Rds. Three blocks have been eliminated from the Azle Rd. because of improvement of Clinton Ave. coinciding with part of that road. City engineer was authorized by City Commission to change specifications so as to provide for gravel shoulders for certain sections of roads of less than 5 ft. in width.

**Marshall, Tex.**—The $300,000 bond issue of Road Dist. No. 1, Harrison County, has been approved by Attorney General and registered by Controller. Bonds have already been sold and money received from purchasers, E. W. Rollins & Sons, of Chicago. Survey work on roads is completed and specification made up by engineer, who is going ahead with map work and getting up his profiles and other data for information of contractors. The Commissioners' Court will meet in regular monthly session and order advertisements for bids and set a time for the opening.

**Wichita Falls, Tex.**—The $45,000 paving bond issue recently voted here has been sold to Sweet, Causey, Foster Co., of Denver.

**Ogden, Utah.**—Paving of Madison Ave., between 25th and 28th Sts., promises to be first public improvement of spring, as City Commissioners have ordered publication of notice of intention.

**Price, Utah.**—At session of Carbon County Commissioners it was decided to call special election on April 12 to vote on question of issuing bonds of $31,000 for purpose of building, repairing and maintaining roads in every precinct of Carbon county.

**Suffolk, Va.**—Council of Suffolk has gone on record as favoring permanent improvement of streets and sewers and that bonds not exceeding sum of $40,000 be issued at time deemed expedient by Council.

**Benwood, W. Va.**—Fairmount Pike will be paved with macadam.

**Olympia, Wash.**—Under compromise reached between senate and bridges committee, $197,500 of public highway fund will be spent on Pacific highway between northern boundary of King County and Canadian line.

**Marinette, Wis.**—Board of Public Wks. will receive bids until 2 p. m., April 7, for about 11,000 sq. yds. concrete pavement. A. L. Hillis is City Engr.

## CONTRACTS AWARDED.

**Stockton, Cal.**—Bids for grading and graveling Stockton-Sacramento Rd. for distance of 8 miles and for installing bridges and culverts within that distance have been opened by County Board of Supervisors to-day. Firm of Irey & McCleary of Lodi was given contract for grading and graveling. Their bid for work was $25,042.47, being lowest on list. For installation of bridges and culverts contract went to Irey, McCleary & Holbrook. Bid of this firm for work was $10,001.29. Bids were opened for installation of culverts on Stockton-Mokelumne Rd. Contract for the work was awarded to Cy Moreing, whose bid for work was placed at $5 per culvert. Next lowest bidder was Irey & McCleary, who bid $7 per culvert.

**Stockton, Cal.**—For grading and graveling contract was awarded to Ivey & McCleary, at $25,042.49, and also for installation of culverts on 41,000 ft. of Stockton-Mokeburne Hill Rd., at $4,066.99. S. A. Carter is Dep. Co. Clerk.

**Brighton, Colo.**—For 4 miles graveling road, to P. Des Pain, Westminster, Colo., at $1.19 per yd.

**Sterling, Ill.**—By city council, contract for Avenue C paving to O'Rourke & Ridge, for $1,892.

**Attica, Ind.**—The Kingman town council has let contract for paving their principal street with brick. Ed. Patton, of Veedersburg, was given contract at $3.10 per front foot.

**Indianapolis, Ind.**—For asphalt to be used by city this year, successful bidders were: John Baker, Jr., $13.31 a ton; Standard Oil Co. of New Jersey, $16.30 a ton; A. F. Zearing Contractors' Supply Co., $15.70 a ton; and the Barber Asphalt Paving Co., by W. F. Moore, $20.30 a ton.

**Indianapolis, Ind.**—Contract has been awarded to Standard Oil Co. of New Jersey by Board of Public Works for asphalt for use of city asphalt repair plant this year. The contract price is to be $16.30 a ton in sheet iron containers, with tare allowance of 3 per cent. in weight.

**Peru, Ind.**—J. F. Hunt has been awarded contract for Sharp Rd., in Washington Township, by County Commissioners. Null & Co., of Tipton County, contracts for Flora Rd., in Jefferson Township, and Wilson Rd., in Butler Township.

**Warsaw, Ind.**—Contract for north and south division of Gresso road in Lake Township has been awarded to Miles & Shafer, of Upland, whose bid was $22,847, providing for construction of four miles of road, part of it through Silver Lake. Part inside town is to be of stone. North and south division of road, five miles in length, for which bids were also received cannot be built at this time because total expense would exceed township's limit of bonded indebtedness. Bid of Thomas E. Sparks, $35,935.60, was low on this division.

**Perry, Ia.**—For 11,250 sq. yds. bitulithic pavement on 4-in. concrete foundation and 10,000 cu. yds. excavation to Jas. Horrabin Co., Des Moines, Ia., at $2 per sq. yd. and 49 cts. for excavation.

**Topeka, Kan.**—For brick asphalt pavement on concrete foundation, following were bidders: J. R. Ramsey, Lawrence; Kaw Paving Co., Topeka, and Olson & Schmidt, St. Joe, Mo.

**Lexington, Ky.**—Contract has been awarded to Carey-Reed Co., a corpora-

tion, for cleaning and oiling macadam streets, hauling, spreading and rolling stone and removing household rubbish.

**Louisville, Ky.**—County Judge Samuel W. Greene and Magistrate R. O. Dorsey, composing road committee of first magisterial district, have accepted bid from W. F. Woodruff to furnish 5,000 cu. yds. of crushed stone and screening to be used in reconstruction of Upper River Rd., at 80 cts. per cu. yd., at Woodruff Quarry, near Blankenbaker's station.

**Flint, Mich.**—Contracts for considerable equipment for use in paving work have been let by Common Council. The awards follow: Milwaukee Concrete Mixer Co., one concrete mixing machine, $1,356.75; Troy Wagon Works, four asphalt wagons at $162.50 each, or $650; Galeon Iron Wks., 1 steam roller, $1,950; Good Roads Machinery Co., asphalt paving tools, $158.20. Award of binder stone for use in paving has been given to the Ohio Quarries Co., of Cleveland.

**Mt. Clemens, Mich.**—A contract signed yesterday between Eastern Michigan Edison Co. and township of Lake assures for Detroit and Mt. Clemens one of finest lake drives in country.

**Port Huron, Mich.**—Contract has been let for 3¼ miles of improved roads between this city and St. Clair. Bid was $32,935.

**St. Paul, Minn.**—The city purchasing agent has failed to approve in whole recommendation of department of public works for purchase of 6,000 cement blocks for construction of crosswalks. The St. Paul Cement Co. bid 5 cts. a sq. yd., and Portland Stone Co. 4¼ cts. Department of public works recommended that 80 per cent of contract be awarded to St. Paul Cement Co. and 20 per cent to Portland Stone Co. The Portland Stone Co. was awarded contract for 20 per cent of order at 4¼ cts., and bid of the St. Paul Cement Co. was rejected. Committee will readvertise for bids for balance of requisition.

**Maryville, Mo.**—By city, for uniform pressure street flusher, to Studebaker Corporation, South Bend, Ind., at $1,-575.

**Columbus, Neb.**—Contract for bitulithic paving on streets in this city has been awarded to William Harribin, of Des Moines and Iowa City, at cost of $1.94½ per sq. yd. This is first bitulithic paving to be done in Nebraska. Estimated cost of paving complete is $97,000. Contract for concrete curbing has been awarded to local firm of Meyers & Luers at 31½ cts. per lin. ft. Estimated cost of curbing is $3,800.

**Omaha, Neb.**—Bids for large amount of paving, scattered in small sections through city, just tabulated by city engineer's office, shows lower prices than prevailed generally last year. Hugh Murphy was only bidder on asphalt and asphaltic concrete, but despite lack of competition bid on former was generally $1.65 per sq. yd., as compared with $1.75 a year ago, and on latter, $1.52 a sq. yd., as compared with $1.67 a year ago. Jo Sesto was low bidder on most of curb and gutter, his bid being 52 cents, as compared with 55 last year.

**Asbury Park, N. J.**—Contract for paving Ocean Ave. with brick has been let to Scheffler-Burns Paving Co. for $132,-364.72. Other bids were: Franklin Construction Co.—United States wood block, $148,268.17. Newark Paving Co.—McAvoy brick, $119,930.24; Bessemer brick, $131.055.12; Republic wood block, $137,-135.60. Charles E. Burd—C. P. Mayer brick, $120,996.45; Bessemer brick, $125,550.81; Seaboard brick, $120,-996.45; Mack brick, $130,611.21; United States wood block, $142,250.13. Van Kueren & Son—Porter brick, $122,607.61; Mack brick, $132,728.41; Bessemer brick, $129,692.17; Jamestown brick, $129,692.17; United States wood block, $143,861.29. Harry Giberson (Asbury Park)—Porter brick, $132,311.21; Wyckoff wood block, $153,564.89. Schneider, Stelle & Co.—Pennsylvania Clay Co. brick, $132,142.45; Bessemer brick, $137,708.89; Williamsgrove brick, $137,203.05; Seaboard brick, $130,624.33; United States wood block, $160,986.73. Scheffler-Burns Co.—Metropolitan brick, $134,894.92; Clearfield clay brick, $129,328.48; Auburn brick, $114,-147.28; Mack brick, $132,364.72 (the successful bid); Pennsylvania clay brick, $129,328.48; Williamsgrove, $121,-231.84; United States wood block, $144,-003.64.

**Bridgeton, N. J.**—Contract for improvement of Greenwich road has been awarded to Richmond & Craig at $4,450.

**Freehold, N. J.**—Contract for paving wings of Norwood Ave., Deal, and laying brick gutters through same thoroughfare has been awarded to William F. McGovern, of Trenton, at special meeting of Board of Freeholders. McGovern's bid was $23,927 for work, the lowest of ten bids received at the last regular meeting of the board. Paving work is to be done with Amiesite.

**Jersey City, N. J.**—For repairing asphalt streets, to W. T. Critchfield, at 82 per cent of standard. M. I. Fagen is city clerk.

**Long Branch, N. J.**—By Deal Board of Commissioners, contract for paving of Ocean Ave., from Allenhurst to Long Branch city line, to Scheffler, Burns Paving Co. on its bid of $132,364.72. Street is to be paved with Mack brick. A complete list of bidders and their figures on each proposition, follows: Franklin Construction Co., United States wood block, $148,268.17. Newark Paving Co., McAvoy brick, $119,930.24; Bessemer brick, $131,055.12; Republic wood block, $137,135.60. Charles E. Burd, C. P. Mayer brick, $120,996.45; Bessemere brick, $125,-550.81; Seaboard brick, $120,996.45; Mack brick, $130,611.21; United States wood block, $142,250.13. Van Kueren & Son, Porter brick, $122,607.61; Mack brick, $132,728.41; Bessemere brick, $129,692.17; Jamestown brick, $129,692.17; United States wood block, $143,861.29. Harry Giberson, Asbury Park, Porter brick, $132,311.21; Wyckoff wood block, $153,-564.89. Schneider, Stelle & Co., Pennsylvania Clay Co. brick, $132,142.45; Bessemere brick, $137,708.89; Williamsgrove brick, $137,203.05; Seaboard brick, $130,-624.33; United States wood block, $160,-986.73. Scheffler, Burns Co., Metropolitan brick, $134,894.92; Clearfield clay brick, $129,328.48; Auburn brick, $114,147.28; Mack brick, $132,364.72 (the successful bid); Pennsylvania clay brick, $129,-328.48; Williamsgrove, $121,231.84; United States wood block, $144,003.64.

**Newark, N. J.**—For 9,200 sq. yds. granite block on 6-in. concrete foundation to Van Keuren & Son, East Newark, at $34,335.75.

**Roselle Park, N. J.**—A big contract for street improvements in shape of concrete paving for Sheridan Ave., from Westfield to Grant Aves.; Walnut St., from Grant to Roselle Aves.; Locust St., from Westfield Ave. to the Lehigh Valley Railroad, has been awarded to C. H. Winans Co., of Elizabeth, for $30,793.25. There were 12 other bidders as follows: John Dorer, Irvington, $32,314.96; T. Foster Callahan, Elizabeth, $32,381.42; Edward L. Faughnan, Elizabeth, $32,928.45; Weldon Contracting Co., Rahway, $33,370.26; Schneider, Stelle Co., New Brunswick, $33,-878.03; Franklin Contracting Co., New York, $34,000.90; Barker & Bonner, Inc., New York, $34,233.74; John E. Foley, Paterson, $34,367.61; Hassam Paving Co., Worcester, Mass., $34.508.15; Rumpf & Stevens, Lake Placid, N. Y., $34,836.88; J. F Shanley Co., Newark, $35,682.14; Paterson, Moran & Co., $45,590.70.

**Springfield, N. J.**—Stewart Hartshorn has been awarded contract to supply crushed stone for street repair by township committee. His bid per ton, according to sizes of stone, was: 2½-in. chips, 65c.; 1½-in., 90c.; dust, 80c; ¾ size, 90c.

**Trenton, N. J.**—Contractor T. J. McGovern of Trenton has submitted bid to Board of Chosen Freeholders of Monmouth County for constructing bituminous road at Deal. There were ten bidders. Highest estimate was $28,500. McGovern's bid was about $24,000, the lowest price ever submitted under State specifications for 2½ ins. of bituminous road material, the price 50c. a sq. yd.

**Geneva, N. Y.**—Following are lowest bidders on 26,000 sq. yds. Bessemer brick pavement and $12,800 cu. yds. earth excavation: R. W. Hensen, Geneva, N. Y., $2 per sq. yd. paving and 50 cts. for excavation; total bid $74,027; McGreevy Const. Co., Elmira, N. Y., $2.30 per sq. yd. paving and 65 cts. excavation, total $84,334.65, and J. B. Hurley, Fredonia, N. Y., $2.07 per sq. yd. paving and 75 cts. excavation, total $84,100.15.

**Long Island, City, L. I., N. Y.**—Following are lowest bidders on highway jobs in Queens: Regulating, grading, curbing, sidewalks, paving with asphalt block, Hopkins Ave., from Grand Ave. to Main St., Long Island City, Borough Asphalt Paving Co., $9,216. Repairing sheet asphalt and asphalt concrete in Third and Fifth Wards, Sicilian Asphalt Paving Co., $12,393.50. Repairing sheet asphalt and asphalt concrete in Second, Third and Fifth Wards, Sicilian Asphalt Paving Co., $15,527.50. Regulating, grading, sidewalks, on west side of Chichester Ave., from Van Wyck Ave. to Baker Ave., Charles A. Myers Construction Co., Fourth Ward, $1,710. Sidewalks, west side of Harvard Ave., from Fulton St. to Baker St., Fourth Ward, Gifford Construction Co., $1,103.63. Regulating, grading, curbing, sidewalks, paving with sheet asphalt, Hughes St., from Doscher Ave. to a point 75 ft. west of Buchman Ave., Second Ward, Uvalde Construction Co., $3,621.35. Regulating, paving with granite block, Thomson Ave., from the viaduct to Diagonal St., First Ward., W. J. Scanlon Co., $30,572. Regulating, paving with granite block, College Point Causeway, from the bridge over Mill Creek to a point 3,100 ft. north, Daniel M. O'Connell, $25,063.

**Newburgh, N. Y.**—Contract has been awarded for furnishing about 51,000 gals. of road oil and 26,500 gals. of tarvia to the Standard Oil Co., New York City, and appropriating $3,600 for same.

**Newburgh, N. Y.**—New street signs of enamel are to be placed on streets in congested portion of city, this including most of territory east of Dubois St. There will be 210 of these signs erected where they are most needed. Street committee of City Council has received bids and contract was awarded to Good Roads Machinery Co., of Marathon, N. Y. Signs will cost 38c. each.

**Rochester, N. Y.**—The contract for sprinkling the streets has been let to Bantel & Hartung, low bidder. The bid was 99.72 per cent of the estimated, which was $93,218. Contract for paving Atlas and Euclid Sts. let to Rochester Vulcanite Pavement Co. for $2,755 and $1,424 respectively.

**Syracuse, N. Y.**—Guy B. Dickison has been awarded contract to pave Lodi St. from N. Salina to Danforth St., price being $4,111. Contracts were let to Pierce, Butler & Pierce Mfg. Corp., Bowler Foundry Co., Smith & Caffrey and Edward Joy for materials used by bureau of water.

**Wilmington, N. C.**—Contract for constructing hard road to Carolina Beach will probably be awarded to C. R. Humphrey, at 76 cts. per sq. yd. The specifications call for road 10 ft. wide and 8 ins. thick. Grading has already been done by county convict road forces. It will be about 7½ miles long and will extend from point on Federal Point Rd. to and through Carolina Beach and about half a mile beyond.

**Hamilton, O.**—At meeting of Board of Control the Andrews Asphalt Paving Co. was awarded contract for Hanover St. with sheet asphalt. The Andrews Co. offered to do work for $32,022, about $2,000 less than next lowest bidder, the Federal Asphalt Co. Estimated cost was $40,-027.50.

**Allentown, Pa.**—Following contracts have been awarded: Crushed trap rock to General Crushed Stone Co., of Easton, Pa. For furnishing dust layer "Texaco" to John Baker, Jr., at his price of 3 9-10 cts. per gallon, and dust layer "Tarvia B," at price of 6 5-10 cts. per gallon. For macadam binder to Barber Asphalt Co. for "Bermudez" at price of 11 8-10 cts. per gallons for minimum quantitl of 3,600 gallons and at 13 3-10 cts. per gallon for any quantity less. Contract for "Tarvia X" macadam binder to Barrett Mfg. Co. at 10 cts. per gallon for a minimum quantity of 300 gallons, and at 10 8-10 cts. per gallon for any quantity less. Oscar S. Hoch is awarded contract for curbing and paving in front of private property. For local crushed stone north and south of Linden St. to George H. Hardner. For local crushed stone in the Fourteenth Ward to the New Jersey Zinc Co. For furnishing street signs to Baltimore Enamel & Novelty Co., at their bid of $101.37.

**Franklin, Pa.**—Upon approval of John E. Ritchey, superintendent of street department, Mayor Fred W. Brown has signed contracts for city with Bessemer Brick Co., Youngstown, O., and the Mack Co., Wheeling, W. Va., for brick to be used in Third Ward and Elk St. paving. Accompanying the contracts were orders to ship the brick. The contracts were awarded to the lowest bidders.

**Wilkes-Barre, Pa.**—Contract for supplying 40,000 gals. road oil will probably be let to Warner-Quinlan Asphalt Co., which was lowest of bidders. Following are bids: Barber Asphalt Co., No. 1—5.9 cts. a gal. in tank car lots and 8 cts. in barrels, carload lots. Atlantic Refining Co.—4.49 cts. a gal. in tank car and 7.37 cts. in barrels. H. S. Freas & Sons—3⅞ to 5⅛ cts. in tank car and 7⅛ to 8⅜ cts. in barrels. Hedley Good Roads Co.—4.2 cts., 4.27 cts. John Baker, Jr.—4.19 cts. in tank car; 7.55 cts. in barrels, and 8.27 cts. if less than carload lots. H. A. Cassedy—5 cts. and 5½ cts. Sun Co.—4.44 cts. in tank car and 7.66 cts. in barrels. Union Petroleum Co.—4⅞ cts. Warner-Quinlan Co.—4⅞ cts.

**Woonsocket, R. I.**—For paving Pond

St. to Simpson Bros. Corp. of Boston, Mass.

**Woonsocket, R. I.**—Board of Aldermen has awarded contract to Standard Oil Co., New York City, to furnish oil and apparatus for street oiling, work to be done by highway department. The oil will be shipped from East Providence to Woonsocket and delivered to city at rate of 4.15 cts. per gallon. According to terms of contract Standard Oil Co. will furnish horse-drawn oil tank, and in addition will, if city needs the service, lay oil at rate of .85 cts. per sq. yd.

**Woonsocket, R. I.**—For 5,600 sq. yds. granite block on 5-in. concrete foundation to Simpson Bros. Corp., Boston, Mass., at $3.58 per sq. yd., total bid $1,-947.50 for new curb and resetting and $20,048 for paving.

**Bremond, Tex.**—By Robertson Co., for paving to Jackson & McCoy, Waco, Tex.

**Corpus Christi, Tex.**—City Council has awarded to Corpus Christi Hardware Co. contract to furnish city with 25 h.p. 10-ton street roller, that will be used in scraping and rolling city streets. Cost was $2,800.

**Richmond, Va.**—Contracts have been placed by Administrative Board for smooth paving of Decatur St., from 10th to 12th, and Porter St., from 10th to 12th. The William P. McDonald Co. of New York city received contract for work of Porter St.

**Richmond, Va.**—L. Lawson, a Norfolk contractor, has been given contract to repair Cary St. Rd., bid for work being $9,368.82. This road is direct route between city and country club, Westhampton suburb and new Richmond College.

**Superior, Wis.**—For reinforced concrete paving on North 13th St., from Hammond to Grand Ave., to Magnus Peterson, Superior, Wis., at $1.37 per sq. yd., and 46 cts. for excavation. Total $4,-340.21.

**Watertown, Wis.**—When bids for laying of concrete pavement in 8th St. from Main St. to Western Ave. were opened by board of public works it was found that Lehmann Bros., of this city, were low bidders in field of six contractors. The bids were as follows: Lehmann Bros., $8,704.41; E. L. Bartlett, $9,403.40; Jensen & Jensen, Chicago, $9,462.91; H. G. Goebitz, Oak Park, Ill., $9,522.85; G. Stanchfield, Fond du Lac, $9,776.09; Geo. Welch, Beloit, $10,049.85. Job will require 1,507 yds. of excavation, 3,735 ft. of curb and gutter and 5,150 sq. yds. of paving. Bids of the contractors in three divisions of work were as follows—(a) excavation, (b) curb and gutter, (c) paving: Welch, (a) 40c., (b) 53c., (c), $1.45; Goeletz, (a) 32½c., (b) 49½c., (c) $1.39½; Stanchfield, (a) 42c., (b) 49c., (c) $1.42; Lehmann, (a) 33c., (b) 46c., (c) $1.26; Bartlett, (a) 30c., (b) 48c., (c) $1.39; Jensen-Jensen, (a) 43c., (b) 54c., (c) $1.32.

## SEWERAGE

**Texarkana, Ark.**—Plans are in process of formation to construct an 8-in. sewer main district from mains near 14th and Olive Sts. out to Highland Park school and intermediates, using alley between Wood and Walnut Sts., as a route.

**Phoenix, Ariz.**—With view to securing installation of adequate sewer system meeting demands of entire municipality of city, tentative propositions and suggestions were discussed at length at regular monthly meeting of Town Council.

**New Britain, Conn.**—Resolution has been introduced in city council providing for issuance of sewer bonds in sum of $90 000.

**Boulder, Colo.**—City Engineer George Joslyn is changing plans for Twelfth St. storm sewer calling for placing of iron grates over "catch basins" to be placed on corners of Walnut and Pearl Sts. and north side of railroad tracks to divert surface water into storm sewer.

**Pana, Ill.**—At meeting of Pana city council board of local improvements announced that plans and specifications for construction and installation of septic tank system for doing away with sewage of city sewerage system were complete and that board had set March 22 as date for public hearing on proposed improvement.

**Springfield, Ill.**—Appropriation of $16,-000 is being considered for extension of town branch sewer in northwest part of city.

**Indianapolis, Ind.**—City administration has decided to proceed with construction of permanent sewage disposal plant, although legislature declined to pass bill permitting special sanitary district to be created for purpose of issuing bonds for cost and creating a special tax levy to provide a sinking fund for redeeming the bonds on maturity. It is plan of administration to build permanent plant and the necessary sewers for carrying the sewage to the plant and assess cost against real estate. It is estimated that work will cost from $1,500,000 to $2,-000,000. One of big items of cost will be construction of immense sewer to carry sewage to plant from sewers now emptying into White River.

**Boston, Mass.**—Following bids were received March 2 for sewerage works in Saybrook St., between Market and Dustin Sts., Brighton: Antony Cefalo, $3,-468.20; Jas. Driscoll & Son Co., $3,484.10; Wm. L. Dolan, $3,492.65; Martino De Matteo, $3,583.82; Charles Latorella, $3,-865; Chilson & Alberta, $3,838.80; Louis Balboni, $4,023.45; Anthony Baruffaldi, $4,029.64; James J. Conway, $4,048.20; John Guarino, $4,120.97; John F. Lynch, $4,181.20; Frank Drinkwater, $4,393.10; A. E. Daddario, $4,597.41; M. H. Kelley, $4,855.42; Henry Spinach Contracting Co., $5,451.80; John Landis, $5,573.68.

**Nahant, Mass.**—On Mar. 20 town will vote on installation of sewer in Fox Hill Rd., distance of 600 ft., to connect with sewer in Flash Rd. at estimated cost of $1,000.

**Springfield, Mass.**—Board of Supervisors will shortly award contracts for large quantity of street work material, bids for which have been received at office of department of streets and engineering. Purchase will include most of material needed for coming season's work. Bids for sewer pipe, paving material, such as granite and wood block, granite curbing, sewer and paving brick and castings have been received. A large number of firms bid on sewer castings. The Quigley Furnace & Foundry Co., of this city, and the Sessions Foundry Co., of Bristol, Conn., were low bidders, each offering to supply manhole covers and receiving basins at $.0144 a pound. The Quigley Co. also bid on miscellaneous castings at $.03 a pound. The other bids were as follows: Fleming Foundry Co., of this city, castings of both sorts, $.0155 a pound; miscellaneous castings, $.0285 a pound; Springfield Foundry Co., castings of both sorts, $.0169; miscellaneous castings, $.04; Davitt Iron Co., of this city, castings of both sorts, $.0169; miscellaneous castings, $0.35; A. G. Spalding & Co., of Chicopee, $.0149 and $.03; John M. Noonan & Co., Inc., of this city, $.0175; no bid on miscellaneous castings; Gibby Foundry Co., $.02; no bid on miscellaneous castings; Merrimac Foundry & Machine Co., of Lawrence, $.0225; miscellaneous castings, $.0275. The goods to be delivered at the city yard. Five firms bid on salt glazed virtrified clay, 4-in. sewer pipe. The New England Pulp & Plaster Co. was lowest, with offer of 79 per cent. off list price, making the net cost $.082 a ft. The other bidding firms offered the following discounts: Warner-Miller Co., Portland Stone Ware Co., of Boston, and Prudden-Winslow Co., 75 per cent. off for pipe to be delivered at city yard; Springfield Contractors' Supply Co., 74½ per cent. off at city yard, and 78 per cent. off f. o. b.

**Wellesley, Mass.**—In one of quietest of town meetings citizens unanimously voted to construct sewerage system to connect with Metropolitan South system near Dadham line. Meeting appropriated $150,000 to start the work; it is expected that whole cost will be about $600,000.

**Grand Rapids, Mich.**—Bids for construction of Webster St. and Powers Ave. sewer have been rejected. Engineer's estimate was $2,141 and lowest bid was $2,768, from Verhey & Kloot. New bids will be asked for.

**St. Paul, Minn.**—Preliminary orders have been introduced into Council for sewer on Goodrich Ave. from Finn to Cleveland Ave. Hearing on Fredericka-Fairmount Ave. system has been set for April 3. It is estimated to cost $39,351.

**St. Paul, Minn.**—House appropriations committee has heard arguments in favor of $70,000 appropriation asked by St. Paul to aid in construction of Snelling-Como Ave. west sewer system. Assistant City Engineer Carroll said sewer would cost $289,000.

**Milltown, N. J.**—Extension of sewer and water lines from mains to curbs is being discussed.

**Roselle, N. J.**—State Board of Health has notified borough that it will have to provide a sewage disposal system within two years.

**Woodcliff, N. J.**—Bids will be received at office of Woodcliff Land Improvement Co., 212 Union St., Union Hill, N. J., for grading 30th, 31st, 32d, 33d and 35th Sts., between Park Ave. and Hudson Blvd., laying pipe sewers therein, and in Hudson Blvd., Woodcliff. Plans in office of engineer in charge, Richard Beyer, Second National Bank Bldg., Hoboken, N. J. Following are estimated quantities: 7,000 cu. yds. earth excavation in street; 100 cu. yds. earth excavation to be cut from borrow pit and deposited on street; 2,000 cu. yds. rock excavation in trench; 2,420 lin. ft. 10-in. vit. pipe sewer; 1,200 lin. ft. 12-in. vit. pipe sewer; 105 lin. ft. 15-in. vit. pipe sewer; 840 lin. ft. 18-in. vit. pipe sewer; 375 lin. ft. 21-in. vit. pipe sewer; 285 lin. ft. 24-in. vit. pipe sewer; 230 lin. ft. 21-in. double strength vit. pipe sewer; 49 manholes; 12 receiving basins; one special concrete manhole; 9,-950 sq. ft. flagging to be relaid, and 550 sq. ft. flagging, new.

**Albany, N. Y.**—Plans for Brighton sewage disposal plant, which is to be a separate plant to take care of sewage in Brighton section of Rochester, are before State Health Department. The plan will have to be approved by State Health Commissioner Dr. Herman M. Biggs before work can begin on plant, which is to be located in Irondequoit.

**Binghamton, N. Y.**—Common Council of city of Binghamton has adopted ordinance to construct sewers in following streets: Judson Ave., from Glenwood Ave. to Loraine Ave., 400 ft. long and 8 ins. inside diameter, estimated cost, $450. Baxter St., from Glenwood Ave. to 100 ft. east of Johnson Ave., 952 ft. long and 8 ins. inside diameter, estimated cost, $1,100. Hazel St., from Glenwood Ave. to Wilson St., 1,090 ft. long, 790 ft. of 12-in. and 300 ft. of 8-in. inside diameter, estimated cost $1,445. Prospect St. from Glenwood Ave. to Twining St., 665 ft. long, 165 ft. of 10-in., and 500 ft. of 8-in. inside diameter, estimated cost $900. Julian St., from Glenwood Ave. to 500 ft. east of Glenwood Ave., 500 ft. long and 12 ins. inside diameter, estimated cost $675. Loraine Ave., from Glenwood Ave. to Prospect St., 720 ft. long, and 8 ins. inside diameter, estimated cost $700. D. W. Foster is City Clerk.

**Fredonia, N. Y.**—Complete plans for erection of sewage disposal plant for village of Fredonia and building of trunk sewers in connection therewith recently prepared have been approved by State Department of Health and have now been sent to State Conservation commission for approval. These plans are for plant of the Imhoff type.

**New York City, N. Y.**—For 5,874 ft. of vitrified sewer pipe 8-in. to 27-in., following bids were received: Lamura Co., 87 Nassau St., average price $2.59 per line. ft.; total bid $33,305.60; Marrone Co., 658 E. 221st St., average price $3.30 per lin. ft., total bid $33,487.65; S. Russek Co., 261 Broadway, average price $3 per lin. ft., total $33,685.75, and I. J. Duffy, 132d St. and St. Ann's Ave., average price $7, total $52,247.09; rock excavation, $3.80 per cu. yd. and $60 average for manholes. M. M. Marks is President of Borough of Manhattan.

**Oneida, N. Y.**—Common Council has authorized bond issue in sum of $8,454.40.

**Patchogue, L. I., N. Y.**—See "Streets and Roads."

**Ravena, N. Y.**—At village election on March 16 taxpayers will vote on proposition to raise $40,000 in installation of sewer system and disposal plant. Village board is anxious to get work under way as soon as ground can be opened. Engineer's plans have been approved by State Health Department.

**Rochester, N. Y.**—See "Streets and Roads."

**Scotia, N. Y.**—On Mar. 16 election will be held for voting on construction of sanitary sewer through Lark, Swan and Holmes Sts.

**Chillicothe, O.**—See "Streets & Roads."

**Cincinnati, O.**—Ordinance will be introduced in council to issue $1,000,000 worth of bonds for improving of Mill Creek trunk sewer. This issue was voted on favorably by the people.

**Columbus, O.**—Funds have been authorized by City Council of Columbus, O., for carrying out recommendation of Mr. Jerry O'Shaughnessy, superintendent, and Mr. C. P. Hoover, chemist in charge, sewage disposal division, for adapting original sewage sedimentation tanks to those of the Imhoff type. Plans for the same have been prepared under Mr. Hoover's direction by Mr. J. J. Morgan. These plans will be reviewed by a board of consulting engineers consisting of Messrs. George W. Fuller, John H. Gregory and George A. Johnson.

**Coshocton, O.**—Council has passed ordinance to sell bonds for installing sanitary sewer in S. 5th St. from Mulberry St. to Pine St.

**Marion, O.**—An ordinance has been adopted to proceed with construction of a sanitary sewer and cellar drain in La Tourette St., from Bennett St. to Brown Ave. Also ordinance to proceed with construction of sanitary and storm-water sewer on Uncapher Ave., from Bellefontaine Ave. to the Columbia St. sewer, and ordinance to proceed with construction of a trunk-line sanitary sewer and cellar drain and storm-wate sewer from the corner of Patten and Park Sts., in Short St., across State St. and over certain property to the Moss alley sewer.

**Mansfield, O.**—City Council has passed resolution approving plans for improvement of Rockyfork and its laterals, with main conduit and its laterals.

**Salem, O.**—Bids will be received at office of the Auditor of city of Salem, O., until 12 o'clock noon of April 7, 1915, for purchase of bonds of said city, in aggregate sum of $10,000, for purpose of constructing intercepting sanitary sewers.

**Springfield, O.**—Arrangements are being made by city manager and engineering department to begin work on extension of high level sewer system. A 12-in. sewer connecting with surveyed route of main sewer at Limestone and Washington and interecepting sewers at first alley north in Limestone, will be first taken up.

**Chelsea, Okla.**—City is considering question of sewer system bond issue in sum of $30,000.

**Hood River, Ore.**—See "Streets and Roads."

**Beaver, Pa.**—Alternate plans for construction of a sewage disposal plant for Beaver Falls have been approved by Dr. Samuel G. Dixon, state commissioner of health. The alternate plans allow Beaver Falls to construct a disposal plant at intersection of Second Ave. and Beaver Rd. and to construct outfall sewer to parallel tracks of P. & L. E. Railroad to point below Fallston Dam where treated sewage will be emptied into the Beaver River. To construct disposal plant and outfall sewer will cost $40,000.

**Beaver, Pa.**—Ordinances proposed bond issues to amount of $215,000 have been introduced at meeting of Beaver Falls City Council. Forty thousand dollars of this amount is necessary for construction of disposal plant and outfall sewer to complete sanitary sewer system; $75,000 will be used to pay off outstanding indebtedness which was contracted in connection with sewer system, and $100,000 is proposed for paving of streets and avenues in city.

**Chester, Pa.**—Following are some of bids received for $125,000 worth of sewers to be constructed this spring and summer in Drexel Hill, Naylor's Run, Kirklyn and Highland Park: Drexel Hill sewers—McNichol Paving & Constr. Co., of Philadelphia, $59,880; Gibbons & Buckley, of Lansdowne, $56,750; P. J. Lawler, of Bala, $60,000. Naylor's Run sewer—Cantrell Const. Co., of Philadelphia, $34,125; Gibbons & Buckley, of Lansdowne, $34,650; P. J. Lawler, of Bala, $54,800; M. O. Hearn, of Philadelphia, $72,000. Kirklyn—Martin Munnminio, Seneca Falls, N. Y., $14,500; Gibbons & Buckley, of Lansdowne, $26,300; Patrick Mahoney, of Oakview, $16,370; P. J. Lawler, of Bala, $16,600. Highland Park—F. T. Buckins, Philadelphia, $14,900; Gibbons & Buckley, of Lansdowne, $22,000; Chas. Moore, of Lansdowne, $21,000.

**Connellsville, Pa.**—A sewer system for Snyder St. and extensions of sewers on Oak, Chestnut and Sycamore Sts. has been recommended by engineer.

**Erie, Pa.**—Sewers will be constructed this spring to cost approximately $25,000.

**Erie, Pa.**—Sum of $21,400 is asked for sewer construction.

**Johnstown, Pa.**—On April 20 the voters of Johnstown will decide whether or not city may issue $1,100,000 of bonds, to cover cost of what has been generally and more or less vaguely referred to as "sanitary improvements." Most people know in general way that it is proposed to build new sewer system and to construct, far down valley on banks of the Conemaugh River, a sewage disposal plant.

**Kittanning Pa.**—State Board of Health has given borough three months in which to make plans for sewage disposal plant.

**Cleburne, Tex.**—Sewer bond issue of $180,000 was carried at election on March 6.

**Galveston, Tex.**—Estimate of cost of constructing reinforced concrete drain on 37th St. between Avenues B and H was reported by Commissioner Sappington as being $19,036.50, of which the city's share would be $17,461; also the cost of a vitrified brick pipe drain on 25th St. between Avenue F and Broadway, as being $8,410, of which the city's share would be $7,992. Action on these proposed drains was deferred.

**Hillsboro, Tex.**—Sewerage bonds in sum of $5,000 will be voted on April 6.

**Milwaukee, Wis.**—Contract for big intercepting sewer on east side of Milwaukee river, from dam to Detroit St., has been awarded to Jones and Erbach, of Pittsburgh, by Sewerage Commission. Bid is $112,000. Work will be started within 30 days.

**Esquimalt, B. C., Can.**—Municipal council has authorized sewer bond issue in sum of $100,000.

**Niagara Falls, Ont., Can.**—Mayor Clendening has said that Council would likely make plans to submit bylaw to voters authorizing construction of proposed Muddy Run trunk sewer at next regular meeting. Mayor Clendening has received word from the Ontario Health Board that plans for sewer had been approved, according to estimates of Engineer Fred Anderson. Plans call for sewer in Huron St. from River road to Victoria Ave., and from there direct to Stanley St. Main sewer will be a tunnel. Inside tunnel there will be pipe line to carry off surface water.

**Niagara Falls, Ont., Can.**—Board of works and sewer committee have voted unanimously for proposed trunk sewer along Muddy Run Creek, and will recommend to city council that by-law be submitted to people authorizing bond issue of about $200,000 to cover cost of work.

## CONTRACTS AWARDED.

**Los Angeles, Cal.**—For construction of sewers in 10th and Gaffey Sts. and Cabrillo Ave. to B. Sutalo at bid of $2,441.

**Los Angeles, Cal.**—For construction of sewer in Thorpe Ave. to Dan Zarubica at $838.80; for sewer in Franklin Ave. to B. Zaich at $11,675; for sewers in Coronel and Adobe Sts. to J. J. Veselich at $935, and for sewers in Murchison, Tremont, Verde, Chelsea and Irving Sts. and Zonal and Lancaster Aves. to B. Zaich at $4,650.

**Vero, Fla.**—J. M. Clack, of Nevada, has been let contract for $150,000 worth of drainage work to be done on canal near Vero, Fla. Work will extend over 90 miles and it will take about year to complete.

**Chicago, Ill.**—By board of local improvements for drains in various streets to Daniel Hardin, Simon Ryan, Garrett Barry, Theodore Di Vito and Louis Scully.

**Fort Wayne, Ind.**—The Moellering Construction Co. has been given contracts for constructing two sewers in Pfeiffer Place addition, totaling 2½ miles in length. Work will be commenced on these drains immediately. The Moellering Co. bid $1.45 a lin. ft.; Derheimer & Co., $1.69 a ft.; Fred H. Fuelling, $1.68 a ft., and M. W. Holben, $1.70 a lin. ft. for the sewer jobs.

**Mishawaka, Ind.**—Contract has been awarded to Staples & Ackerman, of South Bend, to construct sewer on Logan St., from the bridge to 19th St.

**Salina, Kan.**—Contract for 5,482 ft. of sewer of various sizes has been let by city to Eby Constr. Co., of Guthrie, Okla., after 1,260 ft. had been cut off original plans. Sum total of big sewer contract for over a mile of lines is about $4,300, including all manholes and catch basins.

**Boston, Mass.**—For sewerage works in Dunbar st., private land, Bruce and Weld Sts., between Walker St. and Theodore Parker Rd., West Roxbury, contract was awarded to Antony Cepalo. Following are bids received: M. De Sisto, $3,439.52; Antony Cepalo, $3,711.50; West Roxbury Trap Rock Co., $3,785.31; Anthony Baruffaldi, $4,048.75; Wm. L. Dolan, $4,269.80; Charles Latorella, $4,474.60; Frank Drinkwater, $4,671; John Guarino, $5,069.13; Louis Balboni, $5,070.20; Michael Meehan, $5,124.45; M. De Matteo, $5,422.13; James J. Conway, $5,666; A. E. Daddario, $5,694.95; John F. Lynch, $6,257.80; John Landis, $11,090.65.

**Detroit, Mich.**—For vitrified tile and brick sewers in Section A, to Janes & Affeld; in Sections B & C, to Geo. R. Cook, and in sections D, E, F, G, H & I, to Wm Blanck & Co.

**Flint, Mich.**—Following are contracts awarded for sewer construction on March 10: Alley between Broadway and Stever, from Lewis to Ridge, A. H. Prange, Grand Rapids, $1,010.40; Beach St., 5th to Court, Carl Weis, Peru, Ind., $261.05; Buckham, Union to Court, A. H. Prange, $4,197.10; Cleveland and Decker, from Richfield Rd. to Washington, Carl Weis, $618.60; Durand St., Court to Swayze, Bergin & Son, Flint, Mich., $553.68; Eighth St., Gd. Traverse to Beach St., Carl Weis, $425.75; Fifth Ave., Sag. to Chippewa and Detroit to Garland, Barrett & Vitaro, Wooster, O., $352.56; Glenwood Ave., Fox to Thayer, Bergin & Son, $522.62; Ham. Ave., Bush to Broadway, A. H. Prange, $4,100.70; Industrial Ave., Conover to Tilden, Barrett & Vitaro, $834.60; Interceptor, Hickory to Industrial, Barrett & Vitaro, $2,422.20; Liberty St., Mill to 1st and 2d to 3d, all rejected; North St., Elizabeth to Wood and Page to Hamilton, Carl Weis, $726.30; Olive and Indiana, Richfield Rd. to Lewis, A. H. Prange, $742.36; Oren Ave., Hamilton to Dayton, Carl Weis, $408.25; Rankin, Industrial to North, Carl Weis, $437.70; 7th Ave., Detroit to Begole, Barrett & Vitaro, $959.76; 3d Ave., Sag. to Detroit, Barrett & Vitaro, $348.28; Union, Buckham to Beach, Barrett & Vitaro, $229.24; 3d St., Oak to Gd. Traverse and Church to Beach, all rejected; 12th St., Sag. to Church, Carl Weis, $254.20; Waverly, 4th Ave. North, Carl Weis, $375.20; Wood, Sag. to Chippewa, Carl Weis, $146.20; 2d St., Gd. Trav. to Church, all rejected. Where bids have been rejected work will be done by city by day work. D. E. Newcombe is City Clerk.

**Lyons, N. Y.**—By village for construction of sewers to Kennedy-Hamilton Co., Inc., Utica, N. Y., at $79,003.82. Work consists of 13 miles of 6-in. to 18-in. v. t. pipe for sewage disposal plant, contract was awarded to Leary-Morrison Co., Rochester, N. Y., at $37,492. E. Lynch is Res. Engr.

**Newburgh, N. Y.**—For building of sewer in South William St., to James L. Kehoe, at $597.54.

**Charlotte, N. C.**—The J. B. McCrary Co. of Atlanta, Ga., has just closed contracts through Henry W. Loving for following jobs: Southport, $40,000, water and sewer; Estill, S. C., $25,000, water and lights; Morehead City, $24,000, water and sewer, and Winnsboro, S. C., $74,000, water, lights and sewer. The home office in Atlanta has also closed the contract at Woodruff, S. C., for $50,000, water and sewers.

**Hamilton, O.**—City Board of Control has awarded contract for construction of Hanover St. storm sewer to Federal Asphalt Co., for $1,396.70, the Crawford's Run storm sewer to John Trunk for $6,860, and paving of Hanover to Andrews Asphalt Co., as its bid of $32,022. Work on all three jobs will commence at once.

**Allentown, Pa.**—Contracts for work and material aggregating more than $75,000 have been awarded by City Council. Construction of storm water sewer on Summer Ave. from 11th to 12th Sts., from Green to Summer Ave., to George H. Hardner at his price of $11,117.90. Other bids were: H. E. Crilly, $11,400.52; Weaver Contracting Co., $11,569.84. For storm water sewer on Linden St., from Race to Third Sts., to George H. Hardner at his bid of $893. Other bidders were Allentown Construction Co., $892; Weaver Contracting Co., $1,035; R. S. Rathbun, $1,447; Schaeffer & Ackerman, $1,483; H. E. Crilly, $1,996. For a storm water sewer on Union St., from Junction to Tenth St., to G. H. Hardner at his bid of $2,751.20. Other bidders were Frank Cannon, $3,049.25; Allentown Construction Co., $3,079.25; Weaver Contracting Co., $3,221.15; R. S. Rathbun, $3,716; Schaefftr & Ackerman, $3,994; H. E. Crilly, $4,155.

**Philadelphia, Pa.**—Mayor has approved the $35,000 contract to Joseph Perna for relocating sewers in central section of city. This is part of work provided for in a $500,000 appropriation passed by councils to prepare way for delivery loop for transit system, a plan since abandoned.

**Providence, R. I.**—Board of Contract and Supply has awarded contracts for construction of sewers in five streets, as follows: Empire St., Theodore S. Messenger; Broad St., the Valley Co.; Clarendon, Grotto and Upton Aves., Charles Crankshaw.

**Dallas, Tex.**—Work on construction of three sections of proposed sewerage disposal plant is expected to begin within a few days, following signing of contract between city and General Construction Co., of Ft. Worth. The contract price for first three units of system is $55,720.02. The first sewer mains to be laid are Oak Lawn interceptor, serving a large section of North Dallas; the south interceptor, serving South Dallas, and the Cedar Creek sewer, serving a portion of Oak Cliff.

## WATER SUPPLY

**Pasadena, Cal.**—City clerk will receive bids up to 10 a. m., Mar. 19 for pipe and fittings for construction of new high pressure line in northwest. Estimated cost, $30,000.

**Pasadena, Cal.**—Bids for a year's supply of brass fittings for municipal water department have been opened at meeting of Commission and referred to Commissioner M. H. Salisbury for his recommendation. Bids were received as follows: James Jones Co., Los Angeles, $2,494.01; Mueller Mfg. Co., Decatur, Ill., $2,580.44; Glauber Brass Mfg. Co., Cleveland, O., $3,199.44; Foss & Jones, Pasadena, $3,743; F. B. Morton, Los Angeles, $3,693.85; H. R. Boynton, Los Angeles, $3,486.27.

**Santa Ana, Cal.**—The Olive Milling Co. will let contract for construction of reinforced concrete reservoir, with capacity of 115,000 gallons, to supply Olive with water for domestic purposes. Reservoir will be 50 ft. in diameter and will be 8 ft. deep. Company is drilling well and will lay pipe and install pumping machinery. Cost of system, it is estimated, will be between $7,000 and $8,000.

**Montrose, Colo.**—By vote of 191 to 79 citizens of Montrose went on record at special election in favor of new water system, voting bonds to extent of $90,000 for that purpose.

**Wilmington, Del.**—Levy Court has received following bids for laying the 20-in. water main at 3d St. bridge. C. R. Simpson, New York, $2,854. Pugh & Hubbard Co., Philadelphia, $2,434. Jones Construction Co., Wilmington, $2,800. Albert A. McDowell, Marshallton, $3,550. Bids have been referred to court as committee of the whole.

**Washington, D. C.**—An American consular officer in Europe reports that a construction company wants quotations on 2,000 tons of pig-iron pipes, f. o. b. New York, or c. i. f. destination, for water works construction. No. 15,871, Bureau of Manufactures.

**Springfield, Ill.**—Appropriation of $50,000 is being considered for new 36-in. water main from pumping plant at river to city.

**Hartford City, Ind.**—Bids for furnishing pipe to be used in extension water main in Monroe St. have been referred to water works committee with power to act. Bids on 4-in. pipe are as follows: James B. Clow, Chicago, $24.65; United States Cast Iron and Foundry Co., $23.75; the Indianapolis Belting Co., $24.50; George Kiser, of Muncie, $26. These prices are for a ton of pipe. About 18 tons will be necessary for work.

**La Porte, Ind.**—Superintendent Harding of water works department may install new pump at pumping station. City Engineer Goddard is said to be preparing specifications for new pump which is to have pumping capacity of 4,000,000 gallons in 24 hours and to cost, it is estimated, including motor and installation, not over $1,800.

**Shelbyville, Ind.**—In preparation for renewing contract for furnishing of water and light in this city, Council has accepted proposal from Charles Brossman, a consulting engineer of Indianapolis, to serve Council as expert in that line.

**South Bend, Ind.**—City of South Bend, through its city controller, offers for sale bonds for water works purposes to amount of $50,000. Bids will be received by city controller until 11 a. m., March 31, 1915. M. U. Manning is city comp.

**Denison, Ia.**—Petition to call for special city election on question of voting $20,000 bonds for new deep well and extension of mains is now being circulated among voters of city of Denison.

**Muscatine, Ia.**—Between $25,000 and $30,000 will be expended for improvements of different kinds on Muscatine water works system, during coming summer, according to announcement made by Superintendent Molis.

**Lawrence, Kan.**—Ordinance has been passed directing calling of election for submission to electors of city of Lawrence, Kan., proposition of issuing bonds in sum of $350,000 for purpose of constructing municipal water plant, for purpose of supplying city of Lawrence and its inhabitants with water.

**Lexington, Ky.**—A new water main will be laid in near future on N. Mill St. from Main to Church St.

**Louisville, Ky.**—Ordinances have been adopted for erection of large number of fire hydrants.

**Portland, Me.**—Charles H. Gilman & Co., of this city, were successful bidders for $100,000 Kennebec Water District 4 per cent bonds.

**Beverly, Mass.**—Sum of $50,000 has been appropriated for additional water supply.

**Haverhill, Mass.**—Extension of high-pressure water service along River St. will be made this year, according to plans now practically decided upon by members of City Council.

**Taunton, Mass.**—An order for appropriation of $20,000 for water works extensions during year will be introduced into council from committee on finance.

**Grand Rapids, Mich.**—Resolution has been passed to endorse proposed $115,000 bond issue for water extensions.

**Marion, Mich.**—Water works system, to cost $5,000, will be installed.

**Saginaw, Mich.**—Formal action for resubmission to voters of city, at primary election Monday, Mar. 15, of water bonding proposition presented for action April 27, 1914, has been taken by Council. It is the intention of Council if proposition is approved to at once float bond issue and began work on extension of piping system. In addition to $75,000 provided there will soon be available $17,000 to be used in laying large main in South Washington Ave. from Pere Marquette belt line tracks to Holland Ave.

**St. Paul, Minn.**—Bids will be received by the city comptroller up to 12 o'clock, noon, March 22, 1915, for the sale of $280,000 water works refunding bonds of the city of St. Paul.

**Milltown, N. J.**—Extension of water and sewer lines from mains to curbs is being discussed.

**Albany, N. Y.**—Conservation Commission has granted application of village of Sidney, Delaware Co., for approval of its present plans for acquisition of new source of water supply and construction of water works system, as modified by Commission.

**Elmira, N. Y.**—Elmira will take referendum vote on question of purchasing water system of Elmira Water, Light and Railroad Co.

**Hudson, N. Y.**—Commission of Public Works has under consideration purchase of 25 new fire hydrants to replace some of hydrants that are worn out and to use for further extension of fire protection limits of city. New hydrants will be of the two-way kind.

**Lockport, N. Y.**—Water Board has received three proposals for construction of 10-in. water main to be laid from Market St. main, under new Exchange St. lift-bridge and connecting with Mill St. main, and awarded contract to lowest bidder, the C. B. Whitmore Co., on its offer of $856. Other bidders were F. J. LeValley at $860 and Former Alderman Henry A. Smith at $914.

**New Paltz, N. Y.**—Village will vote March 16 on raising $15,000 for improving water works dam.

**Plattsburgh, N. Y.**—Bond issue of $76,500 for water and street improvements has been passed by assembly and senate. H. J. Langlois is city engineer.

**Potsdam, N. Y.**—Taxpayers will vote upon proposition to expend $1,500 to secure data for spring water supply for village mains, at corporate election, March 16. A proposition carrying necessary appropriation will be submitted.

**Rochester, N. Y.**—Water works and finance committees have recommended construction of second section of Conduit 3, from Hemlock Lake, at cost of $500,000. This section will extend from Factory Hollow to Rush Reservoir.

**Rochester, N. Y.**—City Secretary F. X. Pifer has been instructed to advertise for bids for hydrants and for sidewalk repairs for 1915.

**Syracuse, N. Y.**—Mayor Will has consulted with Mark E. Conan, city comptroller, on purchase of $50,000 worth of water bonds to be paid for out of annual surplus of Bureau of Water.

**Chillicothe, O.**—Water bonds in sum of $135,000 have been sold.

**Coshocton, O.**—Council has passed 3,000,000-gal. reservoir ordinance.

**Dayton, O.**—Bonds have been issued in sum of $135,000 for further water works extension. This makes aggregate of $415,000 that has already been issued for this purpose.

**Sandusky, O.**—Under direction of Engineer H. A. Whitney the water department has completed plans for giving residents north of Landis and east of 30th St. better pressure, which will eliminate dry water mains and lack of water for fire purposes.

**Springfield, O.**—In connection with improvements proposed at waterworks pumping station, Superintendent Cotter is preparing estimate of cost of water softening plant. Plan of installing softening plant is only tentative, but will be considered in lieu of purifiers for boilers.

**Wilburton, Okla.**—Special election has been called by City Council of city for April 6 to vote on question of issuing bonds in amount of $100,000 for construction of complete system of waterworks, as per plans and estimates of the Benham Engineering Company, Oklahoma City, Okla., Consulting Engineers for the city.

**Florence, Ore.**—A petition has been presented to city council by Commercial Club requesting that question of bonding city to install water system be placed on ballot at April election. Source of supply determined upon is wells sunk about one-half mile north of center of town. If measure carries it is planned to have city purchase whole block at this place which will be used entirely for water system purposes.

**Chattanoogn, Tenn.** — Purchase of waterworks is being considered.

**Galveston, Tex.**—A. M. Burgess, superintendent of water works department, has been authorized to advertise for bids on 200 tons of 8-in. cast iron pipe, which will cost about $4,500, and will be used for water main extensions.

**Hillsboro, Tex.**—City council has ordered bond election to be held on April 6 in this city to decide whether Hillsboro shall issue $5,000 additional water works bonds, $5,000 sewerage and $5,000 crematory bonds. The water works bond money, if secured, will be used for drilling two additional wells; city sewerage is to be extended.

**Salt Lake City, Utah.**—To complete water works improvements already contracted, it will be necessary to sell another segment of $90,000 water and sewer bond issue, according to report made to city commission by Herman H. Green, city auditor.

**Salt Lake City, Utah.**—Recommendation that City Commission give contract to National Water Main Cleaning Co. for cleaning of 5 miles of water mains in Salt Lake this year is to be made by Charles F. Barrett, superintendent of waterworks commission.

**Tooele, Utah.**—Out of 285 votes cast at special election but 9 votes were against bond issue of $64,000. Proceeds of bond issue will be used in purchase by city of Tooele City Water Co.

**Tacoma, Wash.**—The Metropolitan Park Board has advertised for bids on system of water mains for Point Defiance Park, cost of which has been estimated at $14,000. When system will be put in depends on uncompleted arrangements for a water source.

**Janesville, Wis.**—The $80,000 worth of negotiable municipal "water works" bonds issued by city of Janesville have been sold to Emery, Peck and Rockwood Co. of Chicago for premium of $2,936 by special committee of city officials.

### CONTRACTS AWARDED.

**Pasadena, Cal.**—The James Jones Co. was awarded the contract for the supply of brass fittings for the water department, its bid being $2,494.01.

**Clinton, Ind.**—The Clinton Water Works Co., controlled by city, has let contract to Platt Iron Works, of Dayton, O., for a new pump to be put in at cost of $2,991, and for seven wells to be drilled by Cliff Ringo, of Brazil. Wells will be added to eight now in use, and will be sunk 70 ft. in sands of Wabash Valley, where good water has always been available.

**Fort Wayne, Ind.**—Board of works has contracts for 450 tons of water pipes to United States Cast Iron Pipe Co. and received proposals from four other companies for furnishing hydrants and valves and six companies for furnishing brass equipment.

**Mineral, Kan.**—Work of drilling municipal well will begin about middle of month. City council has let necessary contracts. The United Iron Works, of Joplin, was successful bidder for drilling, furnishing the pump and installing all machinery. Bid was about $4,200. The International Harvester Co., through its agents, Walbert & Timberlake, was given contract for engine. It will be of Mogul type and of 20 horsepower.

**Boston, Mass.**—For laying water pipes in Argyle and Brent Sts., Deering Rd., Helena and Irma Sts., Dorchester; Dimock and Whipple Sts., Roxbury; Aldrich St., Colberg Ave., Dane and Newburg Sts., W. Roxbury, and Saybrook St., Brighton, to John Guarino, at $3,004. Other bids were: Louis Balboni, $3,090; A. E. Daddario, $3,183.50; Martino De